

# AUTOMOTIVE INDUSTRIES

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## *This Week*

Announcements of plant expansions continue to justify further Alvan Macauley's citation of the automobile industries as the pace-makers for America. Read the news section.

On the other side of the world, the Japanese are attempting to set up a complete automotive industry—almost overnight. The exclusive answer to the hows, whys, whens and whats involved in such a plan will be found on page 272.

Continuing the series on educational activities of the larger automobile plants, Harold Gronseth describes what Ford is doing on page 276.

There is an unusually large budget of new-product descriptions beginning on page 287.

## Shut-Down Now General

**All Plants Except Ford Are Closed for Retooling;  
Two Independents Are Ready to Ship New Models**

By Harold E. Gronseth

While retooling operations have cut automobile production down to a mere fraction of recent heavy volume, retail sales have held close to normal seasonal decline. This late in the model season other strong influences adversely affecting sales ordinarily come into play but as yet these apparently have made only a slight impression.

Normally, the closing of plants for retooling suggests the proximity of new models and immediately creates a sales resistance for old lines. Moreover, depleted dealer stocks offer a limited selection to buyers. Obviously, the sales trend cannot indefinitely resist these factors but, fortified as the retail market was this year with a potent consumer demand, little more than a seasonal influence can be detected in delivery figures reported to date.

Greater irregularity and a sharper decline in new car deliveries can be expected from now on until new models become available in quantity. Many dealers already have been drawing on their stocks for a whole month without replenishment from factories. Only Ford now remains in production on 1936 passenger cars and a few companies will be shipping new models in volume during September. Two companies slated to introduce 1937 lines about the middle of the month have scheduled substantial production for

the current month, another plans to start shipping this week and a fair sized producer expects to be under way by the middle of the month. Several are due to start production toward the end of September, but the month will be by far the leanest this year with indicated output for the industry well under the 100,000 mark.

It will be late in October before automobile plants hit their full stride on 1937 cars but everyone is looking for  
(Turn to page 269, please)

## Packard to Expand

**Doubling of Production Facilities  
Goal of \$5,000,000 Program**

Anticipating a production in the next twelve months which will far exceed that of any year in its history, the Packard Motor Car Co. is more than doubling the productive capacity of its plant at a cost in excess of \$5,100,000, according to M. M. Gilman, vice-president and general manager.

"Present expansion activities," he said, "mark the completion of a general development and manufacturing expansion program on which Packard will have expended \$18,000,000. We launched this program in our preparations for the 120 car with a comprehensive plan both for car development work and broadening of our  
(Turn to page 268, please)

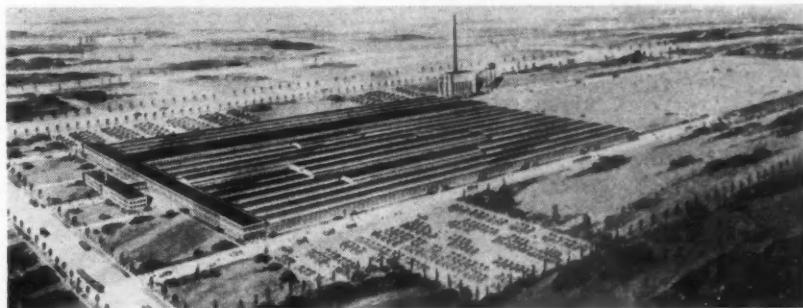
## New GM Plant for East

**\$5,000,000 N. J. Factory to Assemble  
for East and Export Markets**

General Motors Corp. announces it will build a plant for assembly of Buick, Oldsmobile and Pontiac passenger cars for delivery to the East Coast region and to overseas territories at Linden, N. J. The plant, when fully equipped for maximum operation, will represent an outlay of approximately \$5,575,000. Construction will start immediately, with completion scheduled some time in December.

Eighty acres of ground on the Lincoln Highway near Stiles Street in Linden, have been acquired as the site for the new operation which will be one of the largest automobile assembly plants in the world. It will have a normal capacity of 120,000 cars a year. Two-thirds of the production are scheduled for domestic delivery and one-third for export. Approximately 2000 persons will be employed when the plant is operating at full capacity.

The plant will include four buildings and an oval test tract nearly half a mile in circumference. The buildings include the main factory, an office  
(Turn to page 268, please)



Architect's drawing of the General Motors plant to be built at Linden, N. J., at a cost of \$5,575,000.

# July Employment Continued High

*Reports to A. M. A. Show 345,000 Persons at Work in Automotive Industry; Within 8% of Peak*

July reports from all U. S. automobile and body plants received by the Automobile Manufacturers Association show the unprecedented job stability which has characterized recent operations of the industry was carried into the summer. Moreover, average employment for the 1936 season to date is above the 1929 level.

During July 345,000 persons were at work despite the fact that several plants had closed down for retooling. This figure compares with average employment of 363,000 during the nine months since November, 1935, when the 1936 models were introduced. The July figure is within 8 per cent of the peak employment for this period. In contrast with this small range of variation, retail sales have fluctuated in the same period from 217,000 cars in February to 460,000 in April, an increase of more than 100 per cent from bottom to top.

That a level trend of factory jobs was maintained in the face of wide changes in sales volume means that the manufacturers and their dealers protected the factory employees from nine-tenths of the shock of seasonal variation in retail demand. This was

accomplished through the early introduction of 1936 models, which made it possible to build up satisfactory field stocks before the spring spurt in demand. Advance building of inventories of parts and sub-assemblies during periods which otherwise would have been slack also played a large role.

The high average of employment which accompanied this stability record occurred despite the fact that factory sales of vehicles have remained 15 per cent behind the record levels of 1929, while the dollar value of sales is still one-third below the peak levels.

Re-employment outstripped production and sales because of the increase in size, addition of equipment, and improvement in quality of all cars during recent years; factors which increased sharply the amount of labor required per vehicle.

## Ivan Ornberg

Ivan Ornberg, chief engineer of the passenger car division of the Volvo Co., Gothenberg, is dead. Mr. Ornberg was well known in the automobile industry in the United States, having been connected with it for 25 years. His most

recent position in the industry was assistant engineer with the Hupp Motor Car Corp., a position he held for 15 years. Prior to his connection with Hupp he was employed by the McCord Radiator Co. and the Rapid Motor Vehicle Co. He was a member of the latter firm at the time it became part of the General Motors Truck Co.

## Packard Makes RKO Tieup For Introducing New Line

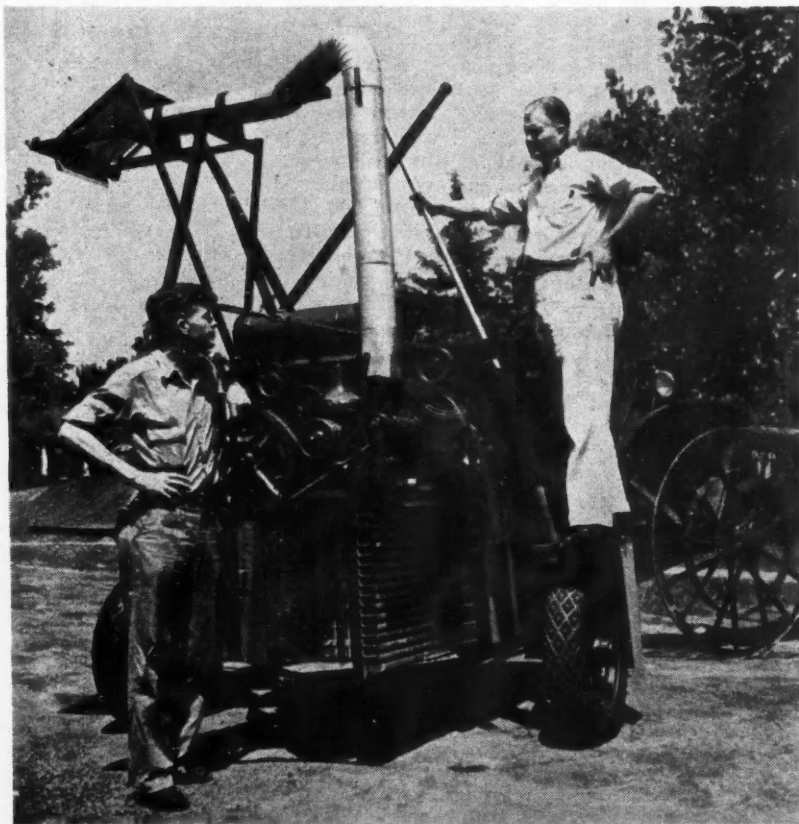
Packard Motor Car Co., and RKO Radio Pictures, Inc., announce a comprehensive cooperative campaign to promote forthcoming new Packard car models, the Packard radio hour featuring Fred Astaire which begins Sept. 8, and the current screen musical "Swing Time," co-starring Fred Astaire and Ginger Rogers.

There will be two contests over a period of eight weeks, the prizes for which will be new Packard cars. One, open to the public, will be based on best descriptions of new Packard cars. The other, open to theater managers and publicity men, will be for the best cooperative campaigns on the picture in conjunction with local Packard dealers. Twelve cars will be given as prizes in the first contest, and three to the theater men. The first contest will be open to all patrons of theaters showing "Swing Time," will be on a national basis and may be supplemented by additional awards made through local Packard distributors.

Announcement of the winners will be made on the Packard radio program and on the screens of theaters. The committee of judges for the theater men's contest will include representatives from the motion picture and advertising trade press. Final awards will be made by F. H. McKinney, of Packard Motor Car Co., Chester J. La Roche, president of Young & Rubicam, Inc., and Ned E. Depinet, president of RKO Distributing Corporation.

## July Car Financing in Canada 24% Over Last Year's Values

Motor vehicles financed in Canada in July while receding seasonably from the peak months of spring and early summer, continued to show improvement over the corresponding month a year ago, according to government figures just released. During July, 14,474 vehicles were financed to the extent of \$5,755,143, a gain of 21 per cent in number, and 24 per cent in dollar value over July last year. Cumulative figures for the first seven months of 1936 show 90,140 vehicles financed for \$36,661,665, increases of 36 per cent in number and 35 per cent in value over the 66,434 units which were financed for \$27,246,614 in the corresponding period of 1935. Included in the totals for July were 4316 new vehicles which were financed for \$3,098,442, or an average of \$718 per unit. There were also 10,158 used vehicles financed to the extent of \$2,656,701 or an average of \$261 each.



Pictures, Inc.

John (right) and Mack Ruse exhibit at Memphis their new invention—a cotton picker. The machine operates by means of an endless chain belt carrying several hundred smooth wire rotating spindles which pluck the bolls from the plants.

## GM First Half Sales 20% Higher in Canada

Every zone in Canada and all General Motors' dealers in the Dominion shared in the upturn of sales reflected by the figures for the first half of the year, recently released by C. E. McTavish, general sales manager. New car sales by General Motors Products of Canada, Ltd., Oshawa, Ont., January to June inclusive, registered an increase of 20 per cent over the same period of last year. The total retail sales of all G.M. car lines for the period were 28,637 and of this number 5250 were sold in the month of June, revealing an early summer activity much better than that of June, 1935.

"Our dealers' performance in selling new cars," commented Mr. McTavish, "was far exceeded by their sales of used cars, which in the six months' period amounted to 38,706, of which more than 10,000 were disposed of in June. Thus, in six months our dealers have delivered 67,300 new and used cars and trucks.

### Niagara Falls ASME Meeting

The Niagara Falls meeting of the American Society of Mechanical Engineers, Sept. 16-19, will offer an unusually interesting program. A special inspection trip through the General Electric plant at Schenectady Sept. 16 will be followed by a two-day technical program at Niagara Falls. Timed to coordinate with the post-convention tours of the World Power Conference, several European engineers will attend the meetings, and a number of them will be speakers. The Buffalo section, host to the meeting, has arranged several good plant inspection trips.

Papers of automotive interest to be presented are: "Performance of Diesel-Electric Locomotives in the Buffalo Area," by J. C. Thirwall, General Electric Co.; "Latest Developments in Aircraft Power Plant Accessories," by S. H. Webster, Eclipse Aviation Corp.; and "Piston Ring Friction in High Speed Engines," by Louis Illmer, consulting engineer.

### Lakey Foundry Working On Big Russian Order

After operating on a one-shift basis, five days a week, throughout June and July, Lakey Foundry and Machine Co. is resuming a double shift in one of its plants. The company is working on a large order from Amtorg Corp. for patterns for a Diesel engine to be manufactured in Russia.

### Automotive Epitaph

By Berton Braley

Here lies

The body of William Burns

Who signalled wrong

When he made

His turns.



European photo

New garbage trucks just placed in service by the city of Vienna, Austria, are streamlined in the modern style and entirely enclosed. Dumping is accomplished, it is said, in 35 seconds without allowing dust to escape.

## Willys Tax Compromise Reached

*Penalties Waived and 75% Reduction Lowers County's  
Claim to \$532,749; Payments Over 5 Years*

Waiver of penalties and reduction of tax by 75 per cent on properties not used in the last three years by Willys-Overland resulted in a compromise figure of \$532,749 to settle the county tax claim and remove the last obstacle to organization of the new Willys-Overland Motors, Inc. The agreement between Empire Securities, Inc., and county tax officials was laid before Judge George P. Hahn in federal court Tuesday.

The county will receive \$152,115 in cash before Oct. 2, and payments of \$38,063 every six months for five years. The balance will be secured by properties not to be used in manufacturing by the new company.

The completed underwriting agreement was to be placed before the court Wednesday and some testimony presented to bring out certain facts about the document. Changes in the tax settlement program brought some slight changes in the underwriting agreement.

David R. Wilson, trustee and president of the old company, testified before the court that the manufacturing program calls for 60,000 to 70,000 cars for 1937. When asked if he considered that a conservative production plan from the standpoint of sales, he said he had sold 47,000 already "from a picture."

He described the new car as larger, but built around the same power plant. It will be a five-passenger model with smart appearance. The first cars are scheduled for Nov. 5.

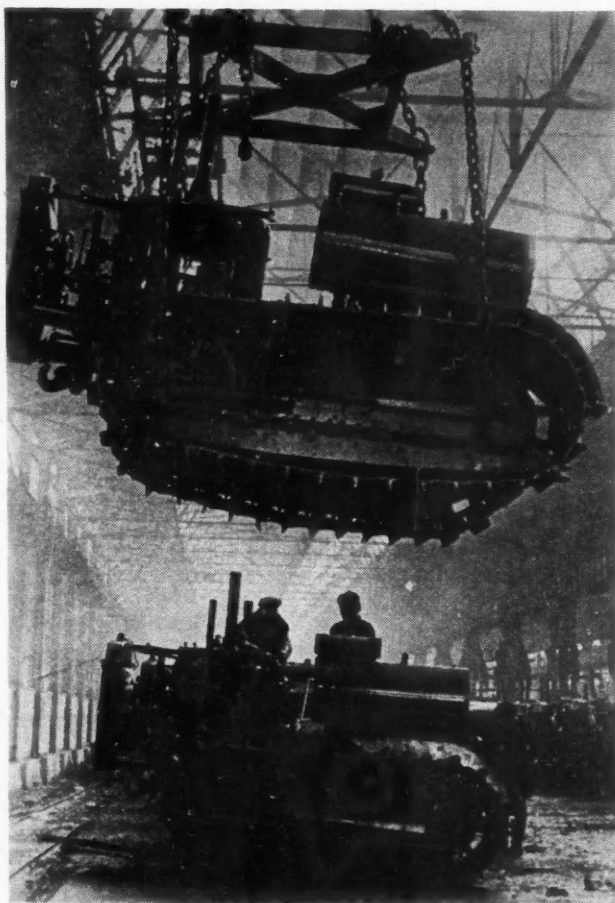
M. B. Bauer, Chicago, of Paine Webber and Co., brokers, testified to approval of the plan on behalf of bondholders who were still holding bonds. He said he was going to elect to receive

common stock and would recommend the same to associates. Mr. Bauer's analysis indicated current values of securities to be received by bondholders would give them practically par and, if held for a time, accrued interest, too. The common stock option, he figures, would enable bondholders to add some profit to par and accrued interest on their bonds. He cited the Studebaker reorganization as an example.

Ward M. Canaday, head of the United States Advertising Corp., and of Empire Securities, Inc., which now owns 70 per cent of the outstanding bonds and 97 per cent of the creditor claims, testified that some of the bonds were purchased at 48 and at the beginning of the receivership were as low as 27. Most of the bonds were purchased at 70. Since revision of the plan bonds sold in the market up to 80, he said.

Mr. Canaday revealed that principal stockholders of the Empire were Ajax Investment Co., the personal holding company of C. O. Miniger, chairman of Electric Auto-Lite Co., the Walter Schott Investment Co., Cincinnati, distributors; the George M. Jones Co., of which Willard I. Webb is president; Ward M. Canaday, Inc., the personal holding company of Mr. Canaday; Hydeborn Corp., Chicago, H. J. Leonard, president, formed by the late John N. Willys to finance production of cars; Clayton Corp., Mrs. Isobel Willys, first wife of Mr. Willys, president; and George W. Ritter, attorney.

The court was expected to hand down its decision by the end of the week. No objections nor unfavorable testimony have been offered.



A finished tractor leaves the conveyor in the vast plant of the Chelyabinsk Tractor Works in the Ural where 20,450 tractors were built last year. This year's production is expected to reach the record of 29,000 units.

Domei

## :SLANTS:

**SPEED-UP**—Soviet workmen are now breaking Ford records, says Boris Markus, chief of the labor and employment section of the State Planning Commission, Moscow, in the current "International Labor Review," published by the International Labor Office, Geneva. With the speed-up resulting from the Stakhanoff movement the time required to make a valve averages 2.7 minutes in the Molotoff works, he states, against 3.4 minutes in the Ford plant and the time for a piston is 2.8 minutes instead of five. Soviet workers, it is claimed, have stepped up production so that, without changes in equipment, they can turn out 100,000 more cars yearly.

**FUEL BLENDS**—Drought in the Midwest, with resulting crop shortages and sharp increases in corn and grain prices, has provided a convincing demonstration of the economic fallacy of forcing the motoring public to use alcohol-blend fuels and the folly of depending upon the fickle whims of nature to set motor fuel prices, in the opinion of J. J. Cavanaugh, executive vice-president of the Chicago Motor Club. Pointing out that had the counsels of the "self-appointed economic witch doctors who have been yodeling from the house tops for use of alcohol-gasoline as a cure-all for farm ills" prevailed, American motorists now would be paying at least 6 cents per gal. more than at pres-

ent. He estimated that the additional cost would have totaled \$1,029,623,940 this year alone. Even the farmers would have had to pay almost \$300,000,000 more than they will pay for gasoline this year, he said, thus obviating the possibility of receiving any compensating income by supplying the alcohol market.

**FOREIGN CHALLENGERS** — The winner of the 1936 French Grand Prix, Jean Pierre Wimille, is the third famous foreign star to file official entry for the 400-mile inaugural race on Columbus Day, Oct. 12, at the Roosevelt Raceway on Long Island. Italy is already represented by Tazio Nuvolari, chief of the Alfa-Romeo team, and England has entered the Hon. Brian Lewis, driving a Bugatti. Wimille also will ride a Bugatti. Son of a French writer, he learned as a boy to drive a car. During his military service he was chauffeur to a French general in Morocco and learned the tricks of high speed driving along the straight, level roads of North Africa. The three European aces are expected to bring out the best in the star American drivers at the new speedway's inauguration.

**GENERATOR**—Demand for electric equipment on cars has grown to such an extent that a big generator is required to meet the needs of electric current, according to Thomas H. Stambaugh, general service manager of the Hudson Motor Car Co., who recently computed that if all the electrical equipment on one of the big Custom

Hudson Eights happened to be turned on at the same time it would be equivalent to an amperage draw of 95.29 amperes, or expressed in watts, would equal the output of a 571.74-watt lighting plant. "Not long ago," says Mr. Stambaugh, "a generator which would charge at the rate of 10 amperes was considered satisfactory. Today our generators have a normal output of 16 to 24 amperes, and for the winter are often adjusted for an even higher output than that."

**TRADE-IN**—An old Detroit Electric was recently turned in to the Montgomery County Motor Co., Inc., Litchfield, Ill., Pontiac dealers, by Mrs. Estelle Beach Davis on a new Pontiac sedan. This is the first gas car ever owned by Mrs. Davis. The electric was purchased new on July 16, 1916, at a cost of about \$2300. It was sold by the dealer for \$50 cash to William Barton of Litchfield who has converted it into an electric welding outfit.

**MIDGETS AND GIANTS**—Extremes in sizes of Bohnalite pistons are exemplified by the three-ounce piston used in "Tiny Tim," a portable lighting plant made by the Continental Motors Corp., and weighing altogether 57 lb., and the big one used in the 450-hp. Buckeye Diesel. The latter piston is 9½ in. in diameter and 18¾ in. long. The sand casting before machining weighs 64 lb.

**HOLLYWOOD PACKARDS**—More than 100 of the best known stars in the motion picture world own and drive large Packards, according to a survey made by Earle C. Anthony, California distributor of the Packard Motor Car Co. Not only the large Packard is popular with movie folk, but numerous 120's are also to be seen on the streets of the film city.

## Oil Consumer Show

### Detroit Exposition to Explain Petroleum Industry to Users

The First International Consumers' Petroleum Exposition is to be held in Convention Hall in Detroit, Dec. 5 to 13 inclusive. This will be the first exposition ever held by the petroleum industry for consumers of its products. The purpose of the show is to acquaint the public through pageants and exhibits with the great advances made by the petroleum industry in production, refining, transportation and marketing. The American Petroleum Institute is arranging a display to cover taxes paid by the industry, amounting last year to \$1,100,000,000. From well to retail outlet, the public will be shown all the details of the vast industry.

Automotive and allied industries are cooperating with the exposition management in preparing the displays.

Glover Watson, president of the company arranging the exposition, has been in business in Detroit for 21 years. "Bob" Byers, of Columbus, O., vice-president of the Lincoln Business Institute, is managing director.

# MEN

**R. B. NICHOLS** has recently been appointed manager of the industrial bearing division of the Bantam Ball Bearing Co. Mr. Nichols was factory superintendent in South Bend for four years previous to becoming manager of the Chicago office, where he spent the past eight years.

**DAVID W. RODGER**, vice-president and director of sales, Federal-Mogul Corp., Detroit, sails with Mrs. Rodger from New York, Sept. 5, for an extended European trip, during which he will visit European automotive factories and Federal-Mogul foreign distributors. He will also attend the Paris Automobile Show.

**FRED S. VORN**, editor of "The Wheel," Studebaker Corp.'s bi-monthly publication, has resigned, to become advertising manager for the truck division of General Motors Corp. Mr. Vorn has been a partner in an automobile agency here and previous to that he was assistant advertising manager of the Studebaker corporation for 15 years.

**JOHN M. FLOYD**, works manager of the Bendix Products Corp., will leave the corporation Sept. 1 to become vice-president in charge of manufacturing and engineering for the A. O. Smith Co., Milwaukee, Wis. Mr. Floyd has been with Bendix for the last 10 years.

**JAMES MANSFIELD CLEARY**, formerly advertising and sales manager of Studebaker and president of the White Co., and since 1934 vice-president of Roche, Williams and Cunningham, servicing the Studebaker account, has announced his candidacy on the Democratic ticket for trustee of the University of Illinois.

**R. E. GRIFFIN**, manager of the car distribution department of the Olds Motor Works, celebrated this week his 20th anniversary with Oldsmobile, and his 15th year as car distribution manager.

**ROBERT M. ROSS**, for several years automobile editor of the *Detroit Times*, has joined MacManus, John and Adams, Inc., Detroit advertising agency, to handle Cadillac-LaSalle publicity.

**GEORGE DAVIS**, of MacManus, John and Adams, Inc., Detroit advertising agency, has been transferred from the Pontiac group within the agency to the Cadillac group where he will function as account executive under the direct supervision of James R. Adams who is the active head of the group.

**EDWARD TAYLOR**, formerly with the D. P. Brother Co., has joined the MacManus, John and Adams, Inc., Detroit advertising agency as account executive with the Pontiac group.

**JOHN KIMBALL**, of MacManus, John and Adams, Inc., Detroit advertising agency, Detroit, has been promoted to account assistant in charge of production in the Cadillac group.

**ALEXANDER A. MOTHERWELL**, former vice-president and general manager of the Chevrolet forging plant, has been appointed superintendent of operations of the Detroit Forging Co., it is announced by Norman H. Macqueen, president. In the past 45 years Motherwell has planned and super-

vised construction of nine forging plants valued at \$40,000,000, including the Buick and Chevrolet units at Flint and Detroit. He was associated with General Motors Corp. for 21 years and for several years was general foreman of the Carnegie Steel Co.'s forge plant at Homestead.

## Labor Crisis Nears

### Akron Rubberworkers' Union May Demand Closed Shop

The tire industry's labor situation in Akron appears to be rapidly drawing to a crisis. With the first convention of the United Rubberworkers Union of America scheduled to be held in Akron, starting Sept. 14, the air in the "rubber city" is tense with expectancy that out of the labor rally may come an organized union demand for a closed shop. The Greater Akron Association, recently organized for the express purpose of making further decentralization of the Akron tire industry unnecessary, is campaigning constructively through newspaper advertising in Akron, but the rubber unions have struck back and through use of the radio have hurled the charge that the association is "trying to poison the minds of Akron citizens" against labor organizations. The union reprisal to the association's campaign was made Monday night, Aug. 23, in a special radio talk by L. L. Callahan, president of the B. F. Goodrich local.

The Association recently issued data to show that an unusually high continuity of employment as well as high

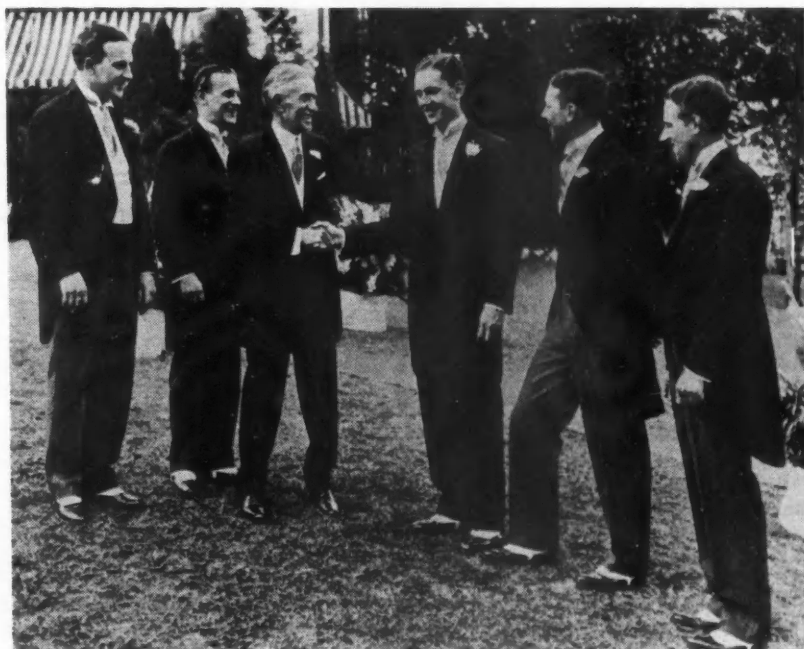
wage rates have prevailed in Akron, and that more than 90 per cent of Akron's rubber workers, who comprise more than 86 per cent of the city's industrial enrollment, worked 40 weeks or more in 1935, with more than 75 per cent working full time.

Although unauthorized sit-down strikes at Goodyear are banned under a union truce, the armistice expires Sept. 14. Sit-down strikes have occurred with increasing frequency in other Akron rubber plants. Firestone recently had one sit-down involving several hundred men which lasted more than two days.

With Goodyear decentralizing and stepping up production in its three subsidiary plants, unionist workers at Cumberland, Md., where Goodyear now operates the Kelly-Springfield plant, threw picket lines around the plant during the past week and sent the management a demand for reinstatement of men laid off, shorter hours, and wages comparable to those paid by Goodyear in Akron. The Cumberland plant capacity, it is reported, has been increased from 2000 to nearly 10,000 tires per day under Goodyear's decentralization program.

### Wisconsin Machinery to Build

The Wisconsin Machinery and Manufacturing Co., of Milwaukee, Wis., makers of pistons, dry cylinder sleeves and cylinder sleeve assemblies, broke ground on Aug. 24 for an addition to its plant.



Acme

Harvey Firestone with his five sons on the occasion of the marriage of his son, Roger, with Miss Mary Seagrave Davis at the bride's home near Trenton, N. J. Left to right: Russell A., vice-president Firestone Park Trust and Savings Bank and director of the tire company; Harvey, S., Jr., vice-president and director of the Firestone Tire and Rubber Co.; Harvey S., Sr., chairman of the board, Firestone Tire and Rubber Co.; Roger; Leonard K., trade sales manager of the tire company; and Raymond C., district manager of the tire company's Richmond branch

# Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for **AUTOMOTIVE INDUSTRIES**

General business activity last week was maintained at about the same level as in the preceding week. Despite the extremely hot weather in many sections of the country, retail sales held up well. Department store sales during the first half of August were almost 15 per cent above those in the corresponding period last year.

## Carloadings Continue to Rise

Railway freight loadings during the week ended Aug. 15 totaled 736,497 cars, which marks an increase of 8204 cars above those in the preceding week, a gain of 122,492 cars above those a year ago, and a rise of 134,709 cars above those two years ago.

## Chain Store Sales Better

Store chain sales during July were 14 per cent above those in the corresponding period last year and reached the highest level on record, according to the *Chain Store Age*. The index for that month stood at 103.6, based on the 1929-31 average as 100, as compared with 108 for June.

## Power Output Higher

Production of electricity by the electric light and power industry in the United States during the week ended Aug. 15 was 14.3 per cent above that in the corresponding period last year.

## Life Insurance Gains

Sales of life insurance during July were six per cent above those in the corre-

sponding period last year. Every section of the country participated in the increase. Sales during the first seven months of this year were three per cent larger than those a year ago.

## Building Increases

Construction contracts awarded in 37 Eastern States during July, according to the F. W. Dodge Corp., amounted to \$294,833,800, as compared with \$233,054,600 for June and \$159,257,500 in the corresponding period last year.

## Farm Income Higher

Farm income from the sale of principal agricultural products during the first half of this year amounted to \$3,132,000,000, as compared with \$2,670,000,000 in the corresponding period last year. Farm income during the second half of this year is expected to surpass that a year ago.

## Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended Aug. 22 stood at 84.1, as compared with 84.0 the week before and 84.3 two weeks before.

## Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended Aug. 9 showed a decline of \$2,000,000 in discounted bills. Holdings of bills bought in the open market and government securities remained unchanged. Money in circulation increased \$14,000,000, and the monetary gold stock rose \$17,000,000.

## CIT Dividend Increased

Directors of Commercial Investment Trust Corp. have recently raised the common dividend from 90 cents to \$1 quarterly and at the same time announced that an extra dividend would be paid later in the year in order to reduce the company's liability under the new surtax on undistributed net profits of corporations.

Only three months ago the company raised the cash dividend rate from 75 cents to 90 cents a share after having paid a 20 per cent stock dividend. A stock dividend of 25 per cent was paid in 1934. The company reported net income of \$3.16 a share for the first half of 1936 on the larger amount of outstanding common stock. This compared with \$2.93 a share on the smaller amount of stock for the first half of 1935.

## Doehler Declares Dividend

Doehler Die Casting Co. has declared a dividend of 50 cents a share of 206,000 shares of common stock payable Sept. 30 to holders of record Sept. 15. This is the first common distribution since Feb. 1, 1925. Regular quarterly dividends on preferred and preference were also declared for Oct. 1 to holders of record Sept. 21. Herman H. Doehler, president, said business is running 50 per cent ahead of last year. July and August have continued the rate set during the first half when earnings were \$2.07 a share on common as against \$1.43 in first half of 1935.

# 40 Years Ago

—with the ancestors of  
**AUTOMOTIVE INDUSTRIES**

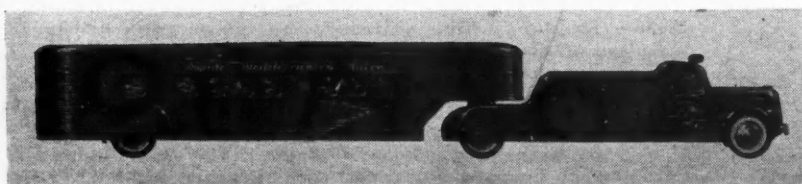
## Diesel Tractor-Bus to Cut Desert Crossing to 15 Hrs.

Light-weight stainless steel buses built on the principle of streamlined trains are to be placed in service over the Syrian desert. The Edward G. Budd Manufacturing Co., builder of light-weight trains, announced this week receipt of an order from the Nairn Transport Co., Ltd., for two stainless steel bus trailers, the first of their kind, for service between Baghdad, Iraq, and Damascus, Syria. Drawn by 150 horse-power Diesel tractors, to be built by the Van Dorn Iron Works, of Cleveland, Ohio, they will make the 530-mile run over open desert in 15

hours, instead of the 35 hours now required by heavy buses.

One bus will be a first-class day coach with seats for 19 passengers, the other a sleeper with upper and lower berths for 14 passengers. Both will be fully air-conditioned. Installation of the air-conditioning equipment and the interior finishing will be done by Fitz, Gibbon and Crisp, of Trenton, N. J.

The entire unit will be 57½ ft. long. The designers didn't have to bother about hair-pin turns and parking, for on the Syrian desert, over which the Nairn Co. has been operating passenger vehicles for 14 years, there are no traffic problems and only one stop—Rutba Wells, an oasis midway the journey.



Trailer bus being built for Nairn Transport Co.

## Don'ts

(for automobile manufacturers)

Don't use packed joints, they are an endless source of trouble. Let the cylinder and head form one integral part and screw all valves down to a shoulder, being careful to leave enough stock outside of the thread to prevent springing of the valve seat.

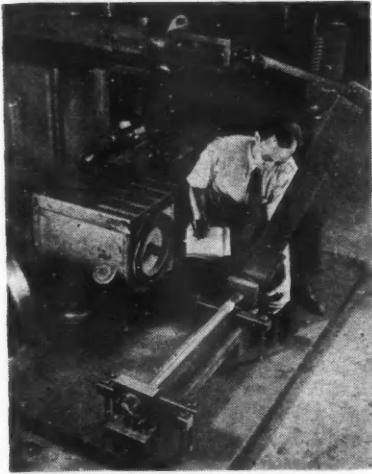
Don't use a water jacket. It is another unnecessary nuisance.

Don't use a single cylinder. The greater the number (within reasonable limits) the better satisfaction you will have.

Don't use aluminum where strength is required. The same weight of steel is many times stronger.

Don't let your sparkers operate at every revolution on a four-cycle engine. On a failure to explode at the proper revolution it is liable to go off on the next with disastrous results.

Don't brake on rubber tires. They slip under a brake when wet as if greased and cannot be depended upon.—From *The Horseless Age*, August, 1896.



Strength of Chevrolet rear axle drive shafts is tested in the laboratory in Detroit on a special instrument. One end of the shaft is locked and a lever twists the other end 48 times a minute through an angle of 27 degrees until, after as many as 45,000 strokes, the axle breaks. The number of strokes withstood by the axle indicates the quality of the steel.

### Sealed Power Employees to Get Quarterly Cash Bonus

Following a meeting of the stockholders of the Sealed Power Corp., manufacturers of piston rings and pistons, held this week, Neil A. Moore, general manager, announced that in place of the corporation's policy of giving all employees an annual bonus, a quarterly bonus plan had been adopted and would be put immediately into effect.

Mr. Moore stated that the quarterly bonus would be paid by the stockholders to all employees, working either on a salary or on an hourly basis. The plan provides that all employed prior to Jan. 1, 1936, would at this time receive two quarterly bonus checks of \$15 each and that all employed prior to March 1, 1936, would receive one bonus check for \$15 at this time. It was also announced today that all employees would receive another quarterly bonus of \$15 at the end of September.

One of the unique features of this plan is that at the beginning of each quarter, announcement will be made of the amount of the bonus to be paid at the end of that quarter. Mr. Moore stated that bonus payments would amount to approximately \$11,000 per quarter.

### Carl C. Hinkley

Carl C. Hinkley, pioneer automotive engineer, died last Sunday in the Henry Ford Hospital, Detroit, after an illness of three months.

Mr. Hinkley was born in Lima, Ohio, 53 years ago. He was educated in the Case School of Applied Science and

## Revised Diesel Fuel Specifications

FUEL	Cetane No.	Viscosity SSU 100 Deg. F.	Water and Sediment %	Carbon Residue %	Ash %	Flash Deg. F.	Sulphur %	A.S.T.M. DISTILLATION				Gravity	Pour Deg. F.
								1 BP	10%	90%	End Point		
Standard Oil Co., Ind., "Stanolind"	50-55	40-45	.05 Max.	0.15 Max.	0.01 Max.	180 Min.	0.50	450-550	600-700				
Phillips Pet. Co.													
No. 2			.05 Max.			190		450 Max.	620 Max.			30-32	
No. 3		70 Max.	0.1			200		460 Max.	620 Min.			26-32	
Sinclair "Superflame"													
250	50	33	0	0.02	Trace	150	0.5	420	440	535	600	34-38	0
355	50	35	0	0.2	0	150	0.25	390-410	500	612	675	38-39	5
(Winter) 355	50	33	0	0.2	0	130	0.25	380	422	608	680	37-40	Zero
Union Oil Co. "Diesel"	56	41		0.05		200	0.65					32.5	0
Cities Service Co.													
Mass. No. 2			0.05 Max.	0.05		180	0.75	440 Max.	620 Max.	580		0	
No. 3		70	0.1 Max.	0.15		200	0.75		620 Min.			10	
Tulsa													
No. 3	49	35		0.05	0	185	0.18	312	440	560	626	38.5	-10
Spec. Diesel No. 1	55	35		Trace	0		0.073	303	410	581	692	39.6	Zero
No. 2	57	44		0.038	Trace	250	0.12	473	534	622	663	34.9	20
Philadelphia													
No. 3			0.1	0.15 Max.		150 Min.	0.75 Max.			620-675		28-34	15-0
Spec. Diesel No. 1			0.05	0.02 Max.		110-150	0.5 Max.		410		600	35-40	0-15
No. 2			0.05	0.05 Max.		125-140	0.5 Max.		420	600	600	32-38	0-15
Sun Oil Co.													
Furnace Med.		28-34	0.05	0.1	0	125-190	0.15 Max.	355-380	440	620	650	34-39	5 Max.
Diesel Light		42 Max.	0.1 Max.	0.1 Max.	0.05 Max.	135 Min.	0.15 Max.	375-405	435-460	625-650	685-720	27-32	0
Continental Oil Co. "Conoco" Diesel	58	40	Trace	0.02 Max.		200	0.2 Max.					0	Max.
Dark Gas Oil	44	35-38	0.05 Max.	0.15 Max.		190	0.5 Max.					0	
Lewistown Dark	61	45-55	Trace	0.14		240 Min.	1.0 Max.					10	Max.
Richfield Oil Co. Diesel Light		35-40	Trace			150 Min.	0.75 Max.	350-430			720	30	15
Shell Petroleum Corp. "Shell Dieseline"		38	0			150 Min.	0.75 Max.					30-37	10
Associated Oil Co. "Associated Motor Diesel Fuel"		35	Trace	0.03	0.1 Max.	150	1.0 Max.	430		688	748	30	
Standard Oil of California Standard 27 plus		40	Trace	0.02	0	186	0.57		460	638		29.9	-10
The Texas Co. Texaco Summer Diesel Fuel	50-55	43-47	0.02 Max.	0.02 Max.		150	0.50						35
Texaco Winter Diesel Fuel	50-55	38-42	0.02 Max.	0.20 Max.		150	0.50						0

This replaces Table II of the article, "Fuels for Diesels," which appeared on page 116, AUTOMOTIVE INDUSTRIES, July 25, 1936

began his automotive career with the Peerless Motor Co. shortly before the turn of the century. He was later chief engineer of the Olds Motor Works at Lansing, leaving there to help organize the Owens Motor Car Co., He was later vice-president and chief engineer of the Chalmers Motor Car Co., and in 1914 organized the Hinkley Motors Corp. at Ecorse, Mich., which built engines for the government during the war.

In 1926, Mr. Hinkley went with the Buda Co., at Harvey, Ill., after his firm was liquidated. He was in charge of its engineering department and specialized in Diesel engines.

Mr. Hinkley was one of the founders of the Detroit chapter of the Society of Automotive Engineers and was a member of the Detroit Athletic Club. He is survived by his widow, Marian C. Hinkley, five children, and three stepchildren.

# Luce Manufacturing Leases Plant

*Truck Body Builder Takes Floor of Auto Body Factory;  
Other Companies Expand Facilities*

Luce Manufacturing Co., Lansing, Mich., maker of specialized truck bodies for fleets, has leased the first floor of the old Auto Body plant at Grand River Avenue and Turner Street. Acquisition of the additional space was made necessary by the greatly increased production which is taxing present facilities, according to Frank A. Schotters, president and general manager. With the additional floor space the plant area of the Luce Manufacturing Co. will be increased from approximately 90,000 sq. ft. to a total of 135,000 and employment is to be increased from 225 to 275 workers.

Twin Disc Clutch Co., Racine, Wis., has started work on a factory addition, 60 x 121 ft., which will cost about \$50,000 with equipment and machinery. Increased business is making the expansion of capacity necessary. Besides clutches, the concern manufactures reduction gears, power take-offs and other tractor and industrial power specialties. P. H. Batten is president and general manager.

Eaton Manufacturing Co. this week announced plans for the expenditure of \$40,000 in improvements for the company's plant in Jackson, Mich. It was also reported that transfer of the company's stamping operations from Detroit to Massillon, Ohio, had been completed. W. C. Ireland is president of the Eaton Detroit Metal Co., a subsidiary with offices in Cleveland, which will operate the new \$300,000 Massillon plant. J. L. Shanahan has been named factory manager. Authorization has also been made for additional office space at the Cleveland headquarters of Eaton which will bring the total Cleveland office and factory space to 316,161 sq. ft.

Plans for expansion of the Palace Travel Coach Corp., Flint, Mich., are announced by David D. Arehart, president and general manager. The company has purchased No. 1 plant of the

General Foundry on Hemphill Road, and 21 acres of adjoining land for new factory buildings. Palace Travel Coach Corp., is said to be the second largest manufacturer of trailer coaches in the country.

AC Spark Plug division of General Motors is rushing expansion of its plant facilities with the addition of a new manufacturing building that will contain 50,000 sq. ft. of floor space. The new building, according to Fred S. Kimmerling, president and general manager, will be completed in September.

## Chevrolet and Ford Get First Choice at Chicago Show Draw

Chevrolet and Ford drew first selections for space allotments at the Chicago Automobile Show to be held at the International Stockyards Amphitheatre Nov. 14 to 21. The drawings were held Wednesday afternoon. Both selected the spaces which they occupied last year.

As was the case last year, this year's show is to be under management of the Chicago Automobile Trades Association. Drawings were held under direction of K. K. Kenderdine, association president; Harry Hollingshead, chairman of the show committee; and A. C. Faeh, show manager. Other cars which drew space allotments were Studebaker, Oldsmobile, Pontiac, Packard, Buick, Hudson, Auburn-Cord, Dusenbergh, Plymouth, Willys, Graham, Chrysler, Nash, DeSoto, Cadillac-LaSalle, Lincoln, Hupmobile and Pierce-Arrow.

Show Manager Al Faeh reported after Wednesday's drawing that space sales totalling more than \$100,000 have already been made. Drawings for truck spaces will be held next Wednesday afternoon. At the same time, Faeh reported that an unusually large number of tourist trailer manufacturers have been making inquiries as to space. He reports also that several manufac-

turers of airplanes have signified their intentions of showing their lines and two bicycle manufacturers have signed for space. A greater number of accessory manufacturers are assured over those who had displays last year.

Mr. Faeh revealed that the show committee is working on plans which are "more extravagant than those which were so startling last year."

## Knight Screw Products to Double Former Capacity

Much needed additional capacity and room for further expansion is provided the Knight Screw Products Co. by its purchase of the plant of McAleer Manufacturing Co. on Lyndon and Prairie Avenues, Detroit. A steel storage building will be erected and some additional equipment installed in the newly acquired plant which has more than twice the floor space of the plant about to be vacated. Moving operations will commence about Sept. 15, and when completed, the company will have double its former capacity.

## Packard to Expand

*(Continued from page 261)*

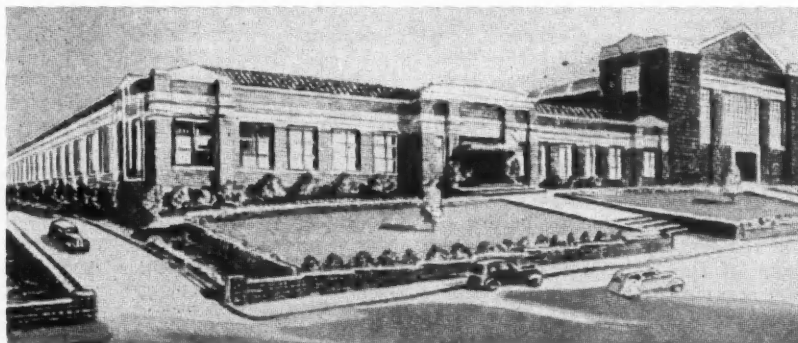
manufacturing and sales activities."

Of major importance in the present Packard plant expansion program is a completely new iron foundry, declared by engineers to be the most modern in existence. New machines, equipment and methods are being installed to give maximum efficiency in the operation of the foundry. They will make possible even greater precision and improve working conditions besides giving a production capacity one and one-half times greater than before. Four new cupolas for melting iron, each with a capacity of 12 tons an hour have been installed. Materials are handled directly from railroad cars into storage bins adjacent to the cupolas. Through a new system, electrically operated charging cars carry materials from the storage hoppers in exactly the right proportion directly into the cupolas. New molding machines and sand treating plants have been installed and there is employed a system new to foundry practice which, it is said, will produce castings of better finish and with greater precision and efficiency.

## New GM Plant for East

*(Continued from page 261)*

building, a loading dock and a power house. The main factory will be 680 ft. wide and 1080 ft. long, part one story and part two stories. Total floor space in this building will be 867,100 sq. ft. Complete body as well as chassis assembly operations will be housed therein. The office building will have two stories and a basement, 45 by 200 ft. in ground dimension. The loading dock will be 450 ft. long by 50 ft. wide and the power house, 125 by 100 ft.



The new Ford plant at Homebush, N. S. W., Australia, was formally opened recently. It is the fifth Ford plant to be erected in Australia and incorporates ideas in planning and equipment from the U. S., England and Europe. Cost of the plant was approximately £125,000.

W. S. Roberts, of Detroit, will be general manager of the new division.

Establishment of the Linden plant marks the second step in the decentralization of production of Buick, Oldsmobile and Pontiac automobiles by General Motors this year. The first move was the opening in May of the plant of the new Southern California division of General Motors at Los Angeles, Calif., to serve the West Coast region. Prior to the establishment of the California plant, Buick, Oldsmobile and Pontiac cars had been assembled only at the parent plants in Michigan.

The present move is in line with the policy of decentralization of industry wherever economically practical, as advocated by Alfred P. Sloan, Jr., president of General Motors.



Walter 6-wheel truck with four driving wheels, the drive being distributed to the front axle and the rear axle of the rear bogie, so as to provide a maximum distance between driving points. It is built by the Walter Motor Truck Co., Ridgewood, L. I.

## Car Output Up 13% in Seven Months

*Truck Production Gained 18% Over '35 Period; Medium Priced Passenger Cars Continue to Lead in Gains*

### Passenger Car Production by Wholesale Price Classes (U. S. and Canada)

First Seven Months 1936 and 1935 Compared

	1936	1935	Per Cent Change	Per Cent of Total 1936	Per Cent of Total 1935
\$500 and under .....	1,372,673	1,330,046	+ 3.2	54.63	59.90
\$501-\$750 .....	1,026,260	805,079	+27.5	40.84	36.26
\$751-\$1,000 .....	79,292	62,027	+28.0	3.16	2.79
\$1,001-\$1,500 .....	25,539	13,538	+88.5	1.01	.61
\$1,501-\$2,000 .....	6,120	5,120	+19.5	.24	.23
\$2,001-\$3,000 .....	2,733	2,940	- 7.1	.11	.13
\$3,001 and over .....	235	1,793	-86.9	.01	.08
Total .....	2,512,852	2,220,543	+13.1	100.00	100.00

### Truck Production by Capacities (U. S. and Canada)

First Seven Months 1936 and 1935 Compared

	1936	1935	Per Cent Change	Per Cent of Total 1936	Per Cent of Total 1935
1½ tons and less .....	502,953	428,227	+17.4	94.01	94.26
2 to 3 tons .....	23,190	19,758	+17.0	4.34	4.35
3½ tons and over .....	4,821	3,761	+28.2	.90	.83
Special and buses .....	4,014	2,536	+58.4	.75	.56
Total .....	534,978	454,282	+18.0	100.00	100.00

## Shut-Down Now General

(Continued from page 261)

November and December to be banner months with production at even higher rates than in the corresponding months of 1935 when the two months accounted for 408,550 and 418,317 units, respectively. In fact, the industry is planning for a substantially bigger year in 1937. Expansion of manufacturing facilities has been general.

The final figure on July production as reported by the Department of Commerce showed output for the U. S. and Canada at 451,474 cars and trucks which compared with 469,355 units in June and 345,297 in July last year. This brought the total for seven months this year to 3,046,298 units, an increase of 371,473 units or nearly 14 per cent over the corresponding period

of 1935. Some are looking for an even greater increase in production next year.

During the second 10-day period this month, Pontiac dealers delivered 4146 cars compared with 3198 for the same period last year and 5037 for the second 10 days of July. For the first 20 days of August, the total is 8481, compared with 7144 in August, 1935, and 10,438 for the first 20 days of last month. It is expected that deliveries for the entire month will be between 12,500 and 13,000 cars.

A substantial jump in retail deliveries during the second 10 days of the month features the August sales chart of Buick Mfg. Co., according to W. F. Hufstader, general sales manager. Sales during the period totaled 5359 units comparing with 3654 in the first 10 days of the month and with 1258 in the corresponding 1935 period.

"Eleven months after introduction of current models and with approximately 150,000 of the 1936 Buicks in the hands of owners in the U. S. we find demand intensified," said Hufstader. "Thus far in August more than 9000 new owners have been added to the Buick list. Retail volume during the past 60 days, formerly a 'slow' selling season, has totaled 31,384, averaging more than 15,000 cars a month. This is comparable with the best selling month of the year and is above the average maintained since the cars were introduced last fall."

The 1,000,000th Ford V-8 1936 car was produced Aug. 20, it was announced at the Ford home offices. At the conclusion of that day's work total production of the 1936 Ford V-8 series had reached 1,000,131 units, it was said. Ford production is now running at the rate of 4500 cars daily.

A single order for 500 Ford V-8 metropolitan buses has been placed with the Ford Motor Co. by the municipally-owned Detroit Street Railway. This is believed to be the largest single order for buses ever placed in the United States. Deliveries are to commence within 90 days. It is expected that the last of the 500 units will be turned over to the railway company by next spring.

The Covered Wagon company reports that its tourist trailer production for June was 1234 units, or more than its entire output for 1935.

### McAler Mfg. Co. in New Plant

McAler Manufacturing Co., producers of lacquer polishes and automobile heaters, expects to be in full production in its new plant on Scotten Avenue, Detroit, by Sept. 15. All McAler operations, which for some time have been conducted in three different plants, will then be consolidated under one roof in what was the former Frigidaire plant. The four-story factory building is being remodeled and an office building of modernistic design is being constructed, the reconditioning program involving an estimated \$60,000.

# Automotive Metal Markets

## Automotive Takings of Steel Maintained with Prospect Industry Will Account for 25% of Year's Output

By William Crawford Hirsch

Day-by-day developments in the steel market serve to create an atmosphere of supreme confidence in the continuance of good automotive demand over the remainder of the year. One steel statistician, usually given to minimizing the importance of automotive consumption, is out with a prediction this week that 1936 purchases by automobile manufacturers will account for 25 per cent of the year's steel sales.

This would be a repetition of last year's record, and unless steel consumption in building and other industries undergoes a sharp spurt in the last four months of the year, automotive takings for the year are certain to set a new high percentage.

Where one steel company sales manager reports a slight drop in incoming automotive specifications, another has figures to prove that in the case of his company the reverse is true and that some automobile manufacturers and parts makers are even pleading for rush deliveries. The latter circumstance, however, is more often than not due to buyers having become so accustomed to the need of prodding sellers repeatedly, if delays in arrival of steel are not to interfere with assemblies, that this procedure has become routine.

In certain descriptions of finished steel, such as ordinary carbon steel bars and hot rolled strip, mills are slowly whittling down their backlogs,

while in others, notably so in cold rolled strip and full finished automobile sheets, incoming specifications impressively replenish gaps made by shipments. Long neglected rehabilitation of basic iron capacity is coming in for consideration, the industry's steel-making and finishing equipment having in the last few years expanded considerably beyond the aggregate efficiency of basic iron blast furnaces. There are those who ascribe this development to the flurry in scrap iron prices, but the relative inadequacy of basic iron capacity has long been a problem, which, like many others, was shelved during the depression.

**Pig Iron**—There is more talk of an advance in pig iron prices for fourth quarter. The advance in heavy melting steel scrap is cited by way of explanation. Prices for cast iron scrap, such as comes in for use in many foundries, have appreciated very little. Moreover, imports at seaboard markets, if not spectacular, suffice to put a damper on too bullish sentiment. So far, very little is heard about representative tonnage sales to automotive foundries.

**Aluminum**—An agreement on prices and extent of production is reported to have been reached by Scandinavian and German producers. The domestic market is quiet and firm, with the undertone of the secondary aluminum market a shade stiffer.

**Copper**—Demand for copper abroad has again broadened and this exerts a certain influence on the situation here, although domestic inquiry is light. European market commentators intimate that much of the recent buying there has been "just a case of transferring metal from one set of books to another" in the same hands, and that speculators were "frightened into the market." The price for electrolytic continues unchanged at 9½ cents.

**Tin**—Quiet, with spot Straits tin quoted at the beginning of the week at 42.30 cents.

**Lead**—Steady and unchanged.

**Zinc**—Quiet and unchanged.

## Calendar of Coming Events

### SHOWS

Automobile Salon, Oriental Fair, Lwow, Poland .....	Sept. 5-15
International Automobile Section, 7th Levant Fair, Bari, Italy .....	Sept. 6-21
30th Automobile Salon, Paris, France, Oct. 1-11	
Olympia Motor Show, London, England, Oct. 15-24	
Czechoslovakia, 26th International Automobile Exposition, Prague .....	Oct. 16-25
9th International Automobile Salon, Milan, Italy .....	November
National Motor Truck Show (N. J. Motor Truck Assn.), Newark, N. J., Nov. 3-7	
Canadian National Automobile Show, Toronto .....	Nov. 7-14
National Automobile Show, Grand Central Palace, New York .....	Nov. 11-18
Philadelphia Automobile Show .....	Nov. 12-19
Scottish Motor Show, Glasgow .....	Nov. 13-21
International Aviation Show, Paris, France .....	Nov. 13-29
Columbus Automobile Show .....	Nov. 14-20
Boston Automobile Show .....	Nov. 14-21
Buffalo Automobile Show .....	Nov. 14-21
Chicago Automobile Show .....	Nov. 14-21
Detroit Automobile Show .....	Nov. 14-21
Washington, D. C., Automobile Show, Nov. 14-21	
Cincinnati Automobile Show .....	Nov. 15-21
St. Louis Automobile Show .....	Nov. 15-22
Pittsburgh Automobile Show .....	Nov. 16-21
Brooklyn Automobile Show .....	Nov. 21-28
Cleveland Automobile Show .....	Nov. 21-28
Montreal Automobile Show .....	Nov. 21-28
Kansas City Automobile Show .....	Nov. 21-29
Milwaukee Automobile Show .....	Nov. 22-29
Baltimore Automobile Show .....	Nov. 26-Dec. 5
28th Automobile Salon, Brussels, Belgium .....	Nov. 28-Dec. 9
Peoria Automobile Show .....	Nov. 30-Dec. 5*
Natl. Exposition of Power & Mechanical Engineering, Biennial Meeting, New York City .....	Nov. 30-Dec. 5
First International Consumers Petroleum Exposition, Convention Hall, Detroit .....	Dec. 5-13
Automotive Service Industries Joint Show, Chicago .....	Dec. 9-13
Illinois Automotive Ass'n, 4th Annual Show and Maintenance Exhibit, Navy Pier, Chicago .....	Apr. 24-28, 1937

### CONVENTIONS AND MEETINGS

National Association Power Engineers, Annual Meeting, Chicago, Aug. 31-Sept. 4	
American Chemical Society, Semi-annual Meeting, Pittsburgh, Pa., Sept. 7-12	
World Power (Fuel) Conference, Washington, D. C. ....	Sept. 7-12
American Gear Manufacturers Association, 19th Semi-annual Convention, aboard SS. Sealand, sailing Chicago to Cleveland .....	Sept. 8-10

\* Tentative dates.

United Rubber Workers Union Convention, Akron .....	Sept. 11
Annual Meeting and Convention of the National Association of Sales Finance Companies, Hot Springs, Va. ....	Sept. 14-16
American Society of Mechanical Engineers, Niagara Falls Meeting, Schenectady and Niagara Falls, Sept. 16-19	
American Transit Association Convention, White Sulphur Springs, W. Va. ....	Sept. 21-24
North American Gas Tax Conference, Richmond, Va. ....	Oct. 6-9
5th Nat'l Road Oil and Asphalt Congress, Tulsa, Okla. ....	Oct. 8-9
Annual Meeting of the National Association of Motor Bus Operators, Detroit, Mich. ....	Oct. 15-16
First Aircraft Production Meeting of the S. A. E., Los Angeles .....	Oct. 15-17
American Trucking Associations, Inc., Third Annual Convention, Chicago, Oct. 19-21	
American Society for Metals, 18th Nat'l Congress, Cleveland, O. ....	Oct. 19-23
16th Annual Meeting of the American Welding Society, Cleveland, O., Oct. 19-23	
American Gas Association, Annual Meeting, Atlantic City .....	Oct. 26-31
American Foundrymen's Ass'n Conference on Foundry Practice, Univ. of Iowa, Iowa City, Ia. ....	Oct. 30-31
American Petroleum Institute, Annual Meeting, Chicago .....	Nov. 9-12
Society of Automotive Engineers Annual Dinner, New York .....	Nov. 12
National Foreign Trade Convention, Chicago .....	Nov. 18-20
16th Annual Meeting, Highway Research Board of the National Research Council, Washington, D. C. ....	Nov. 18-20
International Acetylene Assn., 37th Annual Convention, St. Louis, Nov. 18-20	
Natl. Industrial Traffic League, Annual Meeting, New York City .....	Nov. 19-20
Tin Can Tourists' Get-Together Meeting, Lake City, Fla. ....	Nov. 22-28
Tin Can Tourists' Homecoming, Arcadia, Fla. ....	Dec. 28, 1936-Jan. 3, 1937
Tin Can Tourists' Winter Convention, Clearwater, Fla. ....	Jan. 29-Feb. 8, 1937
Tin Can Tourists' Annual Convention, Sarasota, Fla. ....	Feb. 8-14, 1937

### CONTESTS

100-Mile National Championship, New York State Fair, Syracuse .....	Sept. 12
First Annual 400-Mile International Sweepstakes, Roosevelt Raceways, L. I. ....	Oct. 12
500-Mile International Sweepstakes, Los Angeles Raceway .....	Nov. 29



Handy & Harman, 82 Fulton St., New York City, have published a bulletin No. 1 entitled: **How to Use Handy Silver Solders, SIL-FOS and EASY-FLO Brazing Alloys.** The Standard Fuel Engineering Co., Detroit, Mich., has issued a **Handbook of Refractories.**

A pamphlet describing Nu-Angle reamers is now available. Vedoe-Peterson Co., Norfolk Downs, Mass., prepared it.

**Solved by Shakeproof** is a folder announcing a new engineering service offered to all manufacturers without cost or obligation by the **Shakeproof Lock Washer Co.**, Chicago. Other interesting folders published by the Shakeproof company are **Performance** and the **Secret of Shakeproofs.**

**Gulf Research in Lubrication** is a beautifully illustrated booklet describing the laboratories of the Gulf Research and Development Co. and the tests and experiments that are made there to check the quality of the products of the Gulf Oil Corp. and the Gulf Refining Co., Pittsburgh. Available from the company.

An attractive illustrated folder No. 1569 has been completed by Link-Belt Co., Chicago, on its recently announced **Speed-O-Matic shovel-dragline-crane.** The folder sets forth the advantages of the new power control with its short, easy throw levers.\*

\*Available from AUTOMOTIVE INDUSTRIES.

# Just Among Ourselves

## Nationalism— In Japan

**M**AY we recommend for instructive study the story of Japan's burgeoning automotive industry, which begins on page 272 of this issue. As an aspect of a determined nationalism it isn't unique in today's world, but as a record of accomplishment which telescopes time, it should be hung among the world's records.

If the Japanese market were to be closed tomorrow to all cars originating outside Japan, it would not be an insupportable loss to exporting countries, nor would it be negligible. Complete stricture of the market is something, we believe, which must be faced in the future. Present indications are, however, that Japan is still a long way from being automotively self-supporting in spite of immense progress made to that end.

Meanwhile the growth of the Japanese automobile industry provides some additional market opportunities for American manufacturers, some of whom are already selling component parts to Japanese plants. Surplus and obsolete equipment for manufacturing motor vehicles can be sold, and Japan has not yet developed its own accessory industry to any extent.

Some Japanese-made motor vehicles are being exported—and not only to Manchukuo. We aren't prepared to say now how much of a threat Japanese cars may be to far-Eastern export markets, but the possibility does exist.

Perhaps the best summary of the problem so far as American manufacturers are concerned would be:

"Gather ye rosebuds while ye may."

## And in Erin—

**O**THER notes on upcropping nationalism which affects our industries came to light this week. Since its divorce from England's bed and board, the Irish Free State has utilized the inalienable prerogative of a sovereign state to sock a protective tariff on automobiles, bodies and parts. On passenger cars imported into I. F. S. complete with bodies and valued at not less than £80, the tariff is 33 per cent on the chassis and 50 per cent *ad valorem* on the body. There are many modifications to this schedule, but any way you look at them the scale is prohibitive.

The result is that there are nineteen assemblers of motor vehicles functioning in the Irish Free State, to serve an estimated population of just a little over 3,000,000. Most of the assembly plants are operated by Irish distributors, and all together, about thirty makes of British and American cars are assembled. Most of the plants are in Dublin, one or two in Cork.

\* \* \*

## And In Australia

**C**ONVERSATIONS between representatives of the Commonwealth Government and interested parties foreshadow the possibility of a renewed effort to provide Australia with its own automobile industry. A representative of the Government has gone on record as saying that the matter "is very much alive" and that plans are "progressing satisfactorily."

The *Australasian Manufacturer* is much more emphatic.

"Australia is determined to make her own motor vehicles," says the publication. "Nothing will swerve her from that fixed determination—certainly not the opposition of interested importers."

Several times before, to our knowledge, Australia has been motivated strongly by the desire for a self-contained automobile industry. On one occasion, by one enterprise, five or six hundred cars were assembled.

The designers were carried away, it seems, by the possibilities of a luxurious saloon body, and underestimated the amount of engine it would take to pull it around. Lack of performance licked the car on the Australian market. Other efforts have not reached the productive stage, although one or two of them have had enough vitality to continue for years.

But with the Australian Government interested, as it apparently is, more may come of the present scheme. Australian body plants are doing a fine job and many other automobile components are being manufactured successfully in the Commonwealth.

Bottle-neck of all plans for complete manufacturing seems to be the lack of adequate foundry facilities for casting engine-blocks, etc. This is a real obstacle, but probably not insurmountable if there is enough money back of a motor-vehicle enterprise.

Ford and General Motors have found it profitable to operate several assembly plants each in Australia. Australian pride in an Australian-made car, if it materializes, would probably cut into their market somewhat, but we believe that in the long haul a way could be found to increase the percentage of Australian-made parts in the cars, and so cut down any competitive disadvantage which might arise.

—H. H.



## Introducing Our Correspondent in Tokyo . . . Herbert Leopold

**M**ATERIAL for this illuminating report on the Japanese automotive field, has been supplied to **AUTOMOTIVE INDUSTRIES** by Herbert Leopold, our Tokyo correspondent. It brings up to date the almost-prophetic article written by Norman G. Shidle "Is Japan Headed For World Automotive Power?" published June 2, 1934, and supplements the news reports supplied regularly by Mr. Leopold through these columns.

In order to preserve chronological sequence and to provide generalizations which are beyond the function of a news correspondent, Mr. Leopold's material has been rewritten and rearranged by the staff of **AUTOMOTIVE INDUSTRIES**, so that his responsibility is limited to facts included.

Mr. Leopold was born and educated in Berlin. In 1928 he graduated from Siemens Oberrealschule, Charlottenburg. At the present time he is acting as special correspondent for **AUTOMOTIVE INDUSTRIES** and a number of technical-business papers in Germany and England. To provide this service he surveys regularly 400 Japanese periodicals and maintains close contact with various industries.—THE EDITOR.

**J**APANESE heavy industries are going in for automobile production in a big way. Chiefly responsible for this freshening activity is the recent governmental stimulus of a paternalistic "motor control law" and golden promises of imperial subsidy.

Rapidly lengthening their stride, the Nipponese are enthusiastically establishing automotive research laboratories, developing a machine-tool industry to supply mass production plants, and promoting popular education on the value of motor transportation. Success of their program unquestionably will be hampered by lack of a national highway system and a standard of living which seems to make the expression "cars for the masses" meaningless.

The new Automobile Control Law makes some beneficent provisions for the home industries. Japanese companies licensed under the act are exempted from income taxes and business profits taxes for the first five years, duties are lifted on imported machines and materials, and permission is granted to float debentures in excess of the maximum set by commercial code. However, stipulation is made that these are to be joint-stock companies with control vested in Japanese subjects or Japanese juridical

persons. And the government can restrict imports or impose a maximum tariff of 50 per cent ad valorem. It is also authorized to issue instructions concerning supervision in military affairs.

Apparently the law does not inter-

fere with foreign industrialists operating in the island empire beyond limiting their production. Apropos of this, the act states in effect that any company which manufactured automobiles before Aug. 9, 1935, may continue on the scale of its operations on or before that date.

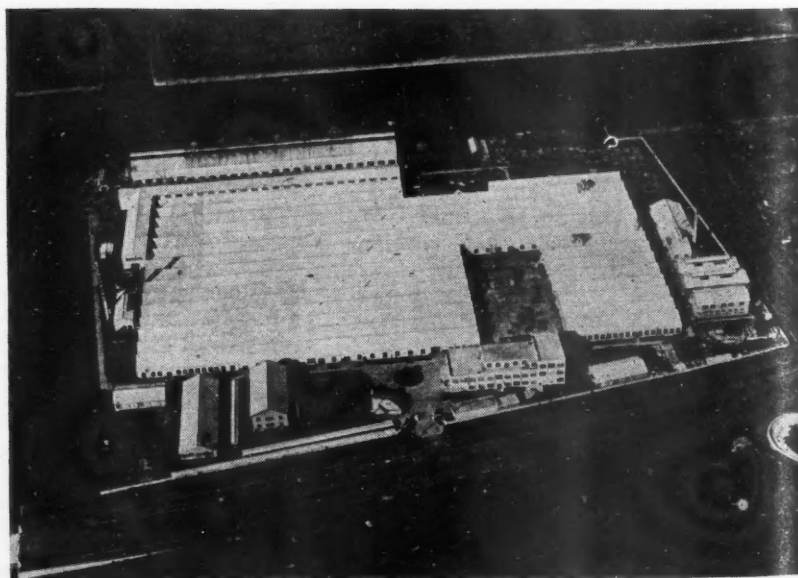
Prompted by the recent governmental measures, a number of Japanese companies have announced their intention of manufacturing light, cheap cars, having piston displacements ranging from 72 to 100 cu. in.

The Nissan Jidosha Kaisha, maker of the baby Datsun, intends to produce medium-sized cars of the Italian Fiat type. The High-Speed Engine Co., backed by Mitsui, which has been making the Ohta baby car of 45.75 cu. in. piston displacement, will produce a larger model having a 73 cu. in. engine. This company recently completed a new plant in Tokyo. The German-built, American-owned Opel has been used as a model by designers of the Tokyo Gas & Electric Co., which makes Chiyoda trucks and buses.

Severing its affiliations with the Ishikawajima Shipbuilding Co., the Automotive Industry, Ltd. has increased its capitalization from 6,500,000 yen\* to 10,000,000 with intention to

\* Yen, approximately = 29.4 cents.

"Datsun" factory of the Nissan Automobile Co., Ltd., in Yokohama.



# Industrial Expansion

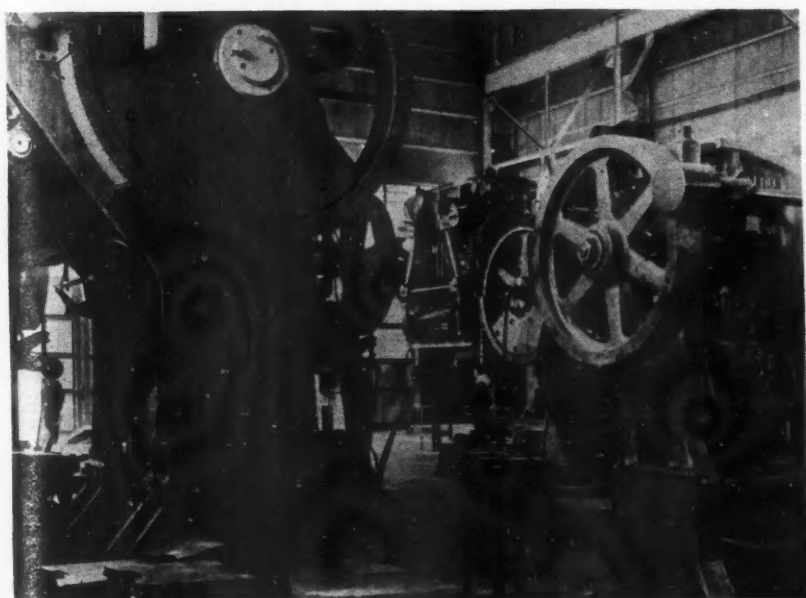
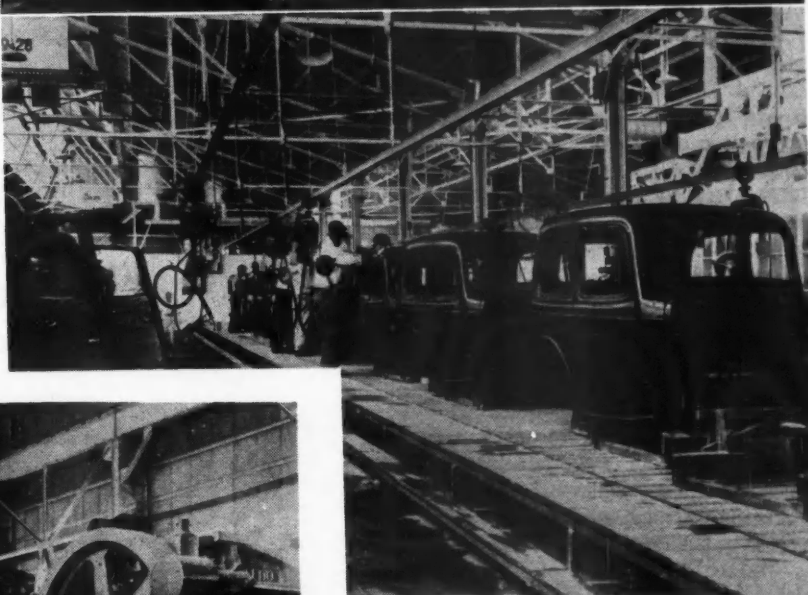
*At Least Ten Cars Now Produced As Legislation And Imperial Subsidies Encourage "Overnight" Development*

manufacture a medium-sized passenger car called the Isuzu. The Ohkura interest also increased the capital of their subsidiary, the Nihon Nainenki (Japan Internal Combustion Engine Co.) by 1,000,000 yen and have established a research department for passenger cars and airplanes. Construction of a new factory at a cost of about 5,000,000 yen is being considered.

Passenger cars will be manufactured and marketed presumably in September by the Toyoda Automatic Looms and Motor-cars Mfg. Co. S. Kamiya, sales manager, expressed belief that Japanese motorcar makers are unlikely to compete favorably with American companies established in Japan unless they reduce overhead expenses originating with the employment of expensive foreign-made machine tools. He says: "Our product will be offered substantially cheaper than GM and Ford cars marketed here as the new 'Toyoda' will be built with Toyoda-made factory equipment. Price has been fixed at 3300 yen. The 113-in. Chevrolet sells for 3695 yen and the 109-in. Chevrolet for 3395 yen. All of these prices being

**Machine shop of the Nissan works  
"Datsun" bodies pass air-brushes  
at Nissan plant**

**All presses in the Nissan shop are of  
American make**



quoted for the latest sedan models."

In the higher price bracket, Kyodo Kokusan Jidosha K.K. (Amalgamated Domestic Car Co., Ltd.) produces two seven-passenger cars of 130-in. wheel-base priced at 7000 yen.

Talk runs high in Japan's petty goods-traffic quarters of a new "pocket truck" manufactured by the Kyosan Jidosha Shokai K.K. (Kyosan Automobile Trade Co., Ltd.). This vehicle is priced at 1590 yen, more than 200 yen cheaper than the truck model of the tiny Datsun

### A Japanese Reaction to the Motor Control Law

**YOSHISUKE AIKAWA**, president of the Nissan Automobile Co., maker of the Datsun car, voices a Japanese reaction to the recent act.

"Since the adoption of the bill at the last session of the Imperial Diet, Nihon Sangyo (Nissan's holding company) has been asked by the Government to give its frank opinion regarding domestic manufacture of cars.

"The automobile manufacturing industry is a very difficult one for everybody, but this company is now making about 500 small automobiles a month. Nissan intends to expand its scope, making larger cars and entering the same field as Ford and Chevrolet."

passenger car. The manufacturer claims that it can operate at full load for 35 to 46 miles per gal. of gasoline. It is designed for a carrying capacity of 500 kg. All mechanical parts of the truck, with exception of the carburetor, are manufactured by the Kyosan works.

A larger truck with a gross-weight rating of 16,500 lb. is produced by the Nippon Jidosha K.K. This company has been building similar trucks for the army.

For the last five years the Imperial Japanese Railway Administration has been engaged in developing a network of bus lines throughout the country to supplement the railroad service. Inasmuch as city buses were not suitable for use on the poor roads of Japan, the Mitsubishi Jukogyo K.K. (Mitsubishi Heavy-Industry Co.) undertook the production of "Fuso" buses in its Kobe Shipyard and Engine Works. In March, 1935, more than one hundred of these buses were in service on government-controlled lines.

Eventually, all other than Diesel powered buses on the railway-operated lines probably will be replaced. In addition to Mitsubishi, orders for Diesel buses have been given to the Ikegai, Jidosha Kogyo and Gasudenki companies. The Ikegai bus for this purpose is designed to accommodate 24 passengers and is powered with a six-cylinder, high-speed Diesel engine of solid injection type.

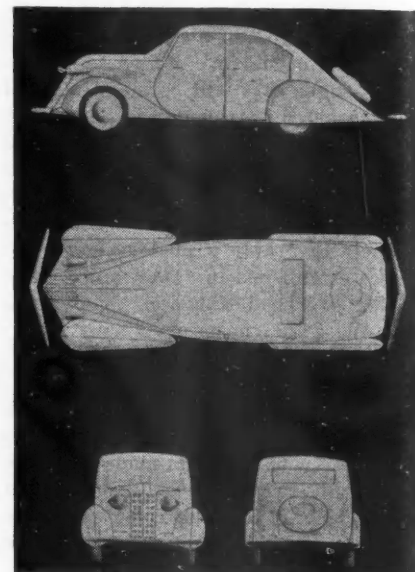
Proposed government subsidy has also encouraged a rush of heavy industries into production of high-speed Diesel engines. Back in 1931 the Mitsub-

bishi Heavy-Industry Co. marketed two types of high-speed Diesels burning heavy petroleum fuels. The Ikegai Iron Works, Ltd., have two stock Diesel engines, a four and a six. Because of the great secrecy shrouding all Nipponese industrial developments no design details are available. It is reported, however, that both are copies of the Austrian Oberhaensli engine.

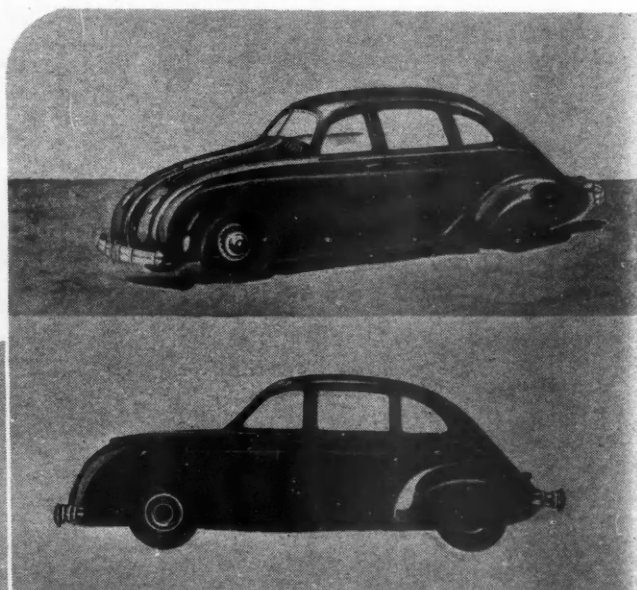
A direct-injection engine is manufactured by the Niigata Tekkojo K.K. (Niigata Iron Works, Ltd.). Design of this four-cylinder engine is based on that of the German A. E. G. A six-cylinder engine of the same general design probably will be placed in production in the near future. Advantages of the Niigata engine are said to be low cost of production, due to the simple form of its combustion chamber, and low fuel combustion. Its weak points are great sensitiveness to fuel characteristics, a

comparatively low maximum speed, the high injection pressure required, and a tendency of the exhaust to be smoky at low speeds.

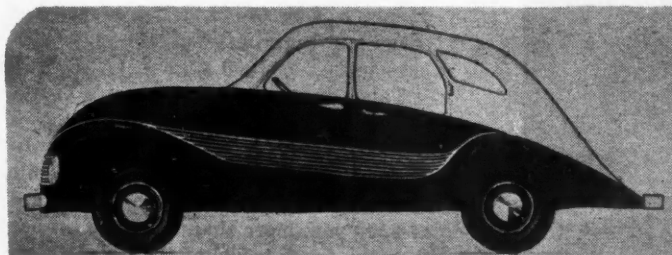
The Ikegai Iron Works, which recently increased its capital by 1,500,000 yen, is preparing to build Diesel-powered passenger cars. The Ikegai passenger-Diesel engine is reported as developing 50-60 hp. at 3000 r.p.m. It is further understood that the cylinder dimensions are characterized by a particularly small bore. The Nippon Jidosha K.K. (Japan Automotive Co., Ltd.), the Nihon Tokusshuka K.K. (Japan Special Steel Co., Ltd.) also plans production of Diesel engines and Diesel-engined vehicles.



## Some Prize-Winning Body



See text  
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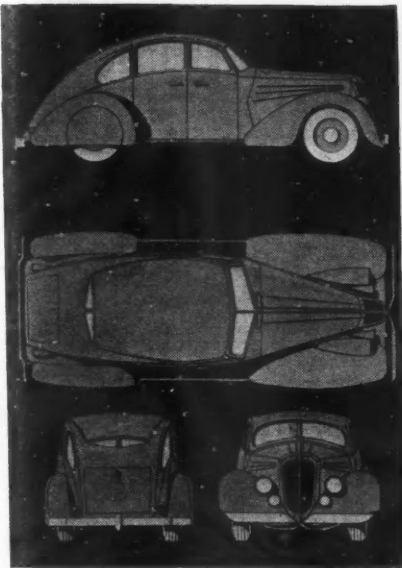


In an effort to "raise technical standards in the manufacture of tools and engines to the level of foreign products," Commerce and Industry Minister Ogawa, at a meeting of the Cabinet on July 3, proposed the establishment of a machinery testing and research laboratory. At present there are only two government-operated industrial testing laboratories and previous appeals from non-official sources for the creation of a national institute have been shelved because of "lack of funds." Now, however, it is felt necessary to meet the demand from the standpoint of national policy and it is expected that approximately 6,000,000 yen will be spent on the enterprise over the next few years.

### An American Reaction to the Motor Control Law

**H**ERE is a brief summary of the views of Benjamin Kopf, managing director of Ford Japan, Ltd., regarding the situation of Ford in Japan under the new law.

1. The Automobile Industry Control Law is too complicated in its codification to be fully understood.
2. Our company won't oppose it.
3. We want to sell as many passenger cars and trucks as possible. If it should prove impossible to maintain our present rate of turnover, we'll resign.
4. We are going to build a new factory.
5. Upon completion of our new factory, business will be carried on along the lines of the past ten years.
6. If it should prove advantageous for us, we may assemble Japanese-made parts to a greater extent than in the past.



Several interesting research developments by Japanese individuals have been reported. Dr. Hikozo Endo, member of the Research Institute for Iron, Steel and other Metals at Sendai, has been granted a patent for a process of coloring and imparting corrosion resistance to iron and iron alloys. In outline his method is as follows: The object is dipped and boiled in a solution prepared by dissolving selenium to saturation. Formation of a film composed of selenic-acid-iron and selenium results. This film is concentrated by boiling the object in water in which alum has been dissolved. Alternatively, alum may be added to the selenium solution in which the object is boiled, in which case the film formed is composed of selenic-acid-iron and alumina. Coloring can be imparted as desired. The

process may be used to produce "naturally" colored automobile bodies and other objects conventionally corrosion protected and colored with lacquer.

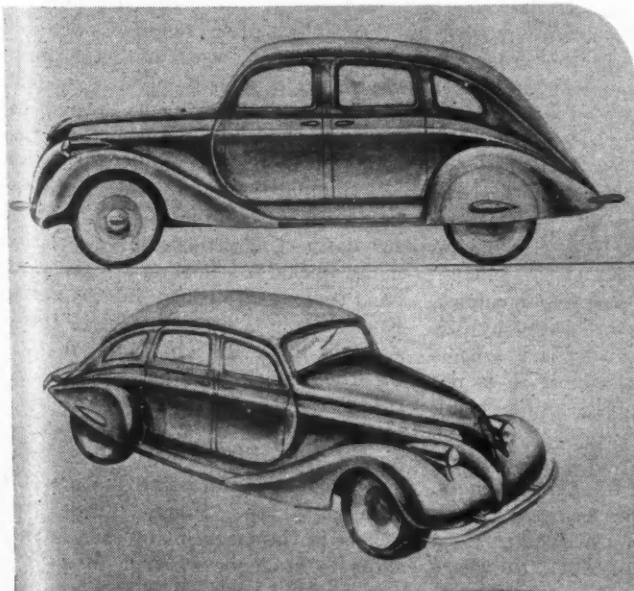
A new type hardening bath for small products of special steel has been developed by Dr. K. Sato, professor at the Tohoku Imperial University at Sendai. It consists of an electric furnace which employs molten salt of metal or non-metal as the heat conducting agent. The period of immersion is remarkably short as compared with other types of electric furnaces because of greater thermal capacity of salts. The inventor claims that it will provide economical service to shops producing automobile and airplane parts.

Tin-nickel-cadmium bearing alloys and special light alloys for aircraft bearings have been introduced in Japan by Yamato Shokai, Tokyo, manufacturers of automobile and aircraft alloys. They also have succeeded in making a Cu-Pb alloy for automobile connecting rod bearings.

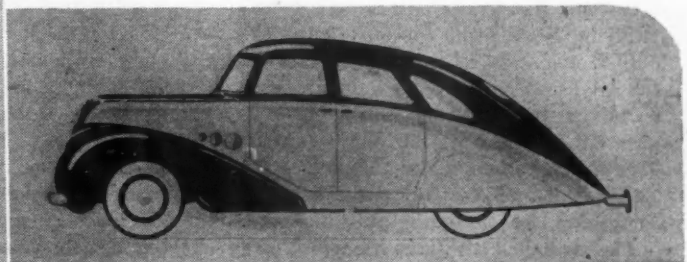
Fuel being another handicap which will impede the hoped-for development of the Japanese automotive industry, the Cabinet Inquiry Bureau will undertake research into the technical feasibility of mixing alcohol with gas. If the research is satisfactory, the government will introduce in the next session of the Diet a bill for the compulsory mixing of alcohol with gasoline. Doubts are voiced in Japan's automotive quarters whether the industry is technically

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## Designs by Japanese Students



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# Ford's

By H. E. Gronseth

**D**EEP in the labyrinth of shops and production facilities that comprise the vast Rouge plant of the Ford Motor Company in Detroit, Henry Ford has set aside three acres of factory floor space and provided the necessary equipment for what authorities consider the finest trade school in existence.

"We try to stimulate boys to think for themselves by working out practical problems and doing practical work," says Henry Ford. "Our text books are the basic things—the materials and forces of nature and human society." That is why he has dedicated this valuable space, in the very heart of his plant, to the vocational training of thousands of boys.

It is in the "B Building," where the famous Ford conveyor lines converge for final assembly operations and amid the incessant hum and throb of production that one finds the most widely known of the Ford educational projects, the Henry Ford Trade School. The same building also houses the Ford Apprentice School. Elsewhere in the vicinity are other Ford sponsored educational activities such as the Training School for unemployed high school graduates, the Edison Institute of Technology and the Greenfield Village Schools for grade pupils. In all, more than 4500 students are enrolled in these institutions.

From this it is plain that Ford's interest in educational work covers a wide range of activity. Actually it begins with the primary grades, for in his Greenfield Village he maintains a group of elementary schools that take pupils from the first grade on through to the twelfth. Here he has reconstructed the old Scotch Settlement School he attended as a boy and a group of three buildings from the birthplace of William H. McGuffey, author of the famous McGuffey readers. These and the old Town Hall and Museum serve as class rooms for the younger pupils.

The so-called "Village Schools" are

under supervision of the Dearborn School Board serving district No. 7 and children of many Ford executives. Pupils are admitted in the order applications are received and there is a long waiting list. That admission is regarded as a highly prized opportunity is understandable since, in addition to the high quality of instruction and the pleasant environment of the historic village, Ford provides free transportation to and from school and free lunches at noon. In fact, all expenses in connection with the schools are borne by Mr. Ford. Even in the elementary schools the ideal of practical education is not lost sight of, the older pupils being trained to do useful work, for which many receive pay. Enrollment numbers 160 and there are six full-time teachers.

Just as he pioneered so many things in the field of manufacturing, Ford charted a new course when, 20 years

ago, he established the Henry Ford Trade School, an institution which has become the pattern for others of similar nature. Because of its experimental character, educators have been greatly interested in observing its development. Several European governments have sent representatives to study the methods employed and results achieved. Some of these representatives remained for daily observation over a period of many weeks. A school on the same basis has been established in Dagenham, England. It is being copied in Russia. At Jam Shad Pur, in India, the Tata Steel & Iron Works has established a trade school modeled after Ford's and under direction of a former Ford employee.

Among the interesting features that distinguish the Henry Ford Trade School is the payment of cash scholarships to students whether in class, in



## **Vocational Schools** have 4500 students enrolled.

**Practical instruction and the development of resourcefulness are basic aims of the system which uses the whole property of the Ford Motor Co. for a laboratory.**

shop or on vacation. Thus the usual procedure in education is reversed; the student is paid rather than pays as he acquires his training. Six dollars a week is awarded each boy when he enters, which amount may be increased to \$24 a week as he progresses.

Payments are made every two weeks

throughout the year, including the four weeks' vacation period. To help develop a thrift habit, each boy receives an additional \$2 a month which must be deposited in some bank and kept there as long as the boy remains in school. These together with the two cash payments make \$375 the minimum and \$1,300 the maximum received annually by each boy.

Incorporated in 1916 as a non-profit institution, the Trade School grew rapidly and soon demonstrated that it

met a genuine need in the community. It opened on October 25 of that year with six boys and one instructor. Now the school has an enrollment of 1800 boys and there are 26 class room and 96 shop instructors. Its purpose is to give needy boys an opportunity to help support themselves and to retain their interest in education.

As many as 800 boys have applied for admission in a single day. Because of its popularity, only about 1 per cent of those who apply can be admitted and only the applications of local boys can be considered. Admission is limited to boys between the ages of 12 and 18 but ordinarily those who enter are under 16. The only educational requirement is that they must be in the normal grade for boys of their age. Preference is given to the needy. Five per cent are orphans and 40 per cent are sons of widows or fathers unable to work.

No contract is made when a boy enters the Trade School and jobs are not guaranteed. Those who complete the course have an academic training equivalent to three years of high school and an experience equal to that ordinarily secured in a shop apprentice course. Entering the school between the ages of 12 and 16, the boys usually remain until 19 when they are offered work in some department of Ford Motor Co. However, they may seek employ-



**(Circle)** Ford students learn to work accurately. Last year spoilage was less than one per cent

**Class in Metallography.** Boys attend classes for one week and then spend two weeks in shop training

**Small groups work out practical shop problems with their instructors**



ment wherever they choose and Ford Trade School graduates may be found in a great many Detroit shops, some in high positions.

Courses are not designed to prepare students for college. Those who desire such training must take history and foreign language in another school. Many do this for the purpose of graduating from a high school, even though they may not plan to go further. More than 10 per cent of the students are taking night work in other schools for that reason.

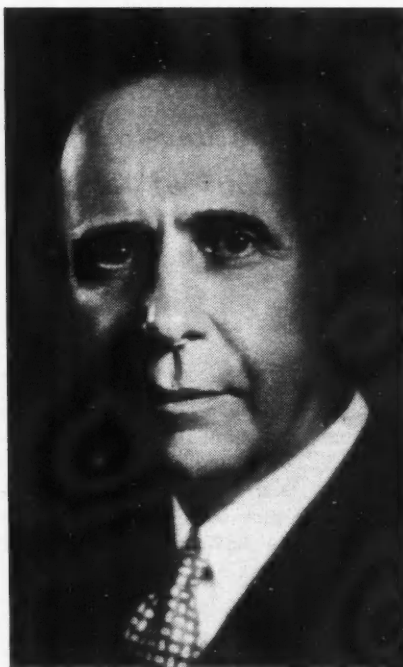
The school is operated on the cooperative plan and is divided into three sections. The boys of each section attend class work in turn for one week and spend the following two weeks in shop, an arrangement arrived at after considerable experimentation but which has worked successfully for 18 years. The quantity and quality of work in both class and shop is found to be much better than obtained under plans involving shorter alternating periods. Classes are one hour and one and one-half hours in length and are conducted from 7.30 a. m. to 2.50 p. m., five days a week. During the two weeks in shop students remain for an eight-hour period.

### Class Work

Class work is planned to cover a period of four years and the subjects are generally of high school grade. English, mathematics, mechanical drawing and shop theory are continued throughout the entire period. In addition, courses are offered in civics and economics. Most of the class work is taught from lesson sheets prepared by the instructors and printed by the school, as suitable texts are not available. The instruction sheets are now bound in book form with paper covers. The text books are sold at cost and a steadily increasing demand has developed from outside sources, a total of 4325 being sold in the first quarter of this year.

Shop work, which occupies two-thirds of the boys' time, is departmentalized. Unlike the academic work which is on a class basis, each boy in the shop progresses as an individual and never with a class. An instructor spends all his time assigning boys to various departments, moving each as soon as he has acquired sufficient skill in a certain type of work. In the shops the boys are under supervision of 96 instructors and special problems may also be brought to the next class period either for class discussion or individual help.

There is no practice work, primarily because such work is regarded as having very little educational value, nor are there projects in the sense that one



F. E. Searle  
Supt. of Ford Schools

boy follows a job through to completion. Such an arrangement is considered uneconomical and contrary to business practice. Each job is done on a work order. An expert estimates the number of hours required by a skilled mechanic to complete the work. An accurate record is kept, and the boys and instructors try to come within the estimate. The percentage of excess time required varies considerably, but averages about 25 per cent more than is required by skilled men. Last year the school completed more than a million hours of tool work, much of it requiring close dimensioning with the use of Johansson gages. Spoilage was less than 1 per cent.

The school shop is equipped to do work that a high grade tool room might undertake. Here may be found hundreds of the finest machines of many types. Total equipment is valued at about \$2,000,000. The whole property of the Ford Motor Co. is used as a vast laboratory. While the school manufactures no material used in an automobile, students are given first-hand information on the mechanical principles involved in the production of parts by means of educational trips through the factory.

Most of the income of the school is derived from the shop. Beginners are given work suited to their skill. Younger and inexperienced boys do considerable repair work. A dozen boys are busy repairing safety goggles. A hundred more are reconditioning small hand tools, screw drivers, hammers, hack saw frames, and wrenches of all

kinds. Other groups are repairing steam, gas, and water valves, steam gages, small electric motors, and carburetors, in all of which certain hand skills are developed. Students repair and paint all machinery. Boys with more experience repair all of the precision tools of Ford Motor Co.; combination squares, height gages, 350 micrometers each month, and nearly 1000 dial indicators a week.

Despite aggregate expenses of more than \$2,000,000, the Trade School has a yearly deficit of only a few thousand dollars as result of the commercial value of shop work performed by students. Some class work also has commercial value, such as drawing and metallography. And in the English classes students are given letters of inquiry to answer. During the past 10 years the Trade School has sold to the Ford Motor Co. \$18,000,000 work of work. Of this, \$11,500,000 was distributed to the boys in cash. An additional \$300,000 was given them as a thrift fund and they were served over a million dollars worth of lunches.

### Practical Training

Throughout the entire course, practical training and self-reliance of the student is emphasized. The boys are given all the responsibility they can assume and the instructor does not unnecessarily impose his authority or his plans on them. Absence of a formalized impersonal attitude so common in many schools, was one of the chief attributes of the school commented upon by an outstanding educator on a recent visit. And for this significant quality, credit must go to Superintendent F. E. Searle, who heads the Ford educational activities. A sympathetic man, who knows his boys, Mr. Searle has the confidence and respect of all the students. Graduate of Williams College, he began his teaching career with the old Detroit University where one of his pupils was Edsel Ford. He has been with the Trade School since its inception in 1916. On Oct. 25 the Artisan Guild, alumni association of the Ford Trade and Apprentice Schools, will celebrate with appropriate ceremony the twentieth anniversary of the Trade School's founding.

The Ford Apprentice School, with 2500 enrolled, draws its students from employees of the Ford Motor Co. Many are graduates of the Trade School who are specializing in some trade while others are employees who have shown unusual ability. Any employee is eligible. A special foreman in the department moves them from one operation to another as fast as they master the work.

(Turn to page 292, please)

# The Horizons of Business

By Joseph Stagg Lawrence

## A Threat to Peace

**MR. THOMAS S. LAMONT**, the distinguished partner of J. P. Morgan & Co., returning from Europe, deprecated American apprehensions of another world war and averred that the intelligent nationals of Great Britain were much less disturbed about the Spanish situation than Americans who were thousands of miles away.

We do not agree with Mr. Lamont. Furthermore, we are inclined to raise the question which, it is reputed, Andy Mellon always asked people who came to him with a "proposition," namely, "What is your interest in this matter?"

International bankers do not expose themselves unwittingly to interview. If caught by the press without design on their part, they, like other wise men of the world, have a fund of banal platitudes with which to deflect the shafts of the scribes.

### The International Banker and War

No house with the world wide commitments, direct and indirect, of J. P. Morgan & Co. welcomes any war, least of all a war that may have the far-reaching ramifications of the Spanish conflict. The fact is that international bankers dread war. This may not agree with the hypotheses of headline-hunting politicians like the Honorable Senator Gerald T. Nye or that sparkling group of muckraking journalists who have discovered in the acquisitive instincts of munition makers and international bankers the seed of all war.

War disturbs the free flow of capital. It leads to the confiscation of securities and funds which the citizens of one country may hold in another. It distorts the normal course of trade and jeopardizes the property rights of belligerents and neutrals. The whole structure of international finance rests upon the precarious foundation of international peace.

Therefore, to return to the first searching inquiry of Mr. Mellon, we may answer and say that in this instance the interest of Mr. Lamont lies in the preservation of peace. It is to his interest and the group for which he speaks to allay fears and minimize

dangers. The interest of Mr. Lamont would not permit him to admit the true proportions of the danger. Since this interest is humane in its broad effects, however selfish its immediate origin, the use of the press to spread a view which may not accord strictly with the fact should be condoned.

### A Powerful Fledgling of Mars

The fact is that we have a more authentic *casus belli* than any which the world has seen since the French Revolution. The issue which led to the American Civil War may have been as profound and as intense as that which occasions the present bloodshed in Spain. It was an American issue, strictly local, in sharp contrast to the Spanish issue, which runs like a sinister yellow-red thread over the entire globe.

Its universal quality is by no means its worst attribute. It cannot be individualized, localized or compromised. Communism is a form of economic relationship. It describes, roughly, a state of society in which government regulates all life, economic and religious as well as political. Hence the state is known as the "totalitarian" state. Thus communism and fascism are alike in that they embrace all of the individual's life and are therefore "totalitarian" although the "totalitarianism" rests upon such diverse basic dogma that the two are violently opposed to each other. This explains the curious phenomenon of two "totalitarian" states, i. e. Italy and Germany, taking one side in the Spanish struggle and a third "totalitarian" state, i. e. Russia, taking the other side.

### An Issue That Cannot Be Compromised

Communism glorifies the worker. Human labor produces all value. Management and capital obtain a part of this value, all of it labor-produced, only because they are able to exploit the worker. Thus in a communistic, totalitarian state the worker is supreme and all the authority which the state exercises must discover its sanction in the will of the worker. Without

digging too far into the theory of communism we pause to make this point. It is impossible for an individual to be an effective communist and be happy. Philosophical nourishment fails to sustain the communist. He demands a certain order in society and a mental image of that order will not do. His scheme cannot work unless all the elements participate. If some elements are unwilling they must be coerced.

The distinction is of great importance in defining the true proportions of this threat to world peace. A man can be Christian, a Jew or a Mohammedan. It may rasp his ego to know that fellow citizens in open day and plain sight pursue another faith and by their actions say that his faith is false. Volumes of history have been written in the blood of religious wars. Yet religion is a matter which can be individualized or localized, as witness the tolerance that prevails in almost every part of the world today.

Communism refuses to yield to such a solution. Fancy a community, a peaceful community, in which happy communists, socialists, syndicalists, fascists and capitalists live side by side! Furthermore, communist, fascist and capitalist nations make poor neighbors. Commercial intercourse is difficult. When communism fails to operate according to the Marxian blueprints, the monkey wrenches in the machinery and the sand in the bearings, according to sturdy proletarian diagnosticians, have all been introduced by wicked capitalist neighbors. Here is a situation not conducive to peace. It is difficult to see how it can be resolved satisfactorily until one side or the other is completely victorious.

### Is the New Deal the Pacific Ointment?

Wars are caused by fundamental issues about which individuals and nations feel so intensely that they are willing, nay eager, to go to war. Wars are also caused by conflicting ambitions. These may be territorial, economic, influential or dynastic. Such ambitions may be compromised satisfactorily or by a bit of territory, trade privileges, partial sovereignty or obeisance to a ruling family. Whether some such compromise may in the end

(Turn to next page, please)

be worked out between communism and capitalistic individualism remains to be seen. Certainly no satisfactory emulation of the two has yet been developed—or are we simply too biased to be

able to recognize it in the New Deal?

At any rate, the bloody strife in Spain is much more than a squabble between rival factions. The spectators in the galleries are intent upon the

gladiatorial fortunes in the pit. Unless the combat is settled quickly some of the spectators will join the fray, the soothing deprecations of Mr. Lamont notwithstanding.

## Bearing Protection Device

By W. R. Griswold

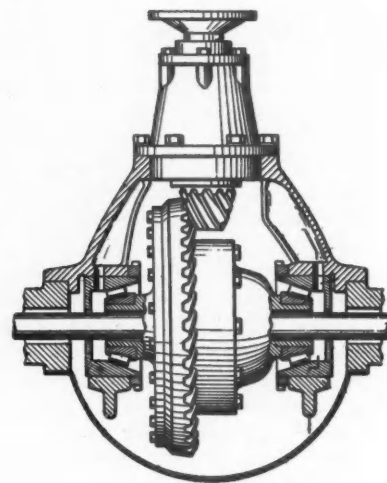
WITH some types of gearing it is customary to reduce the friction between the meshing teeth by partly submerging one of the gears in an oil bath. Heavily loaded gears, such as hypoid gears, have a relative motion which tends to strip the oil off the teeth during the first part of the engagement, so that inadequate lubrication is likely to result.

To prevent such stripping of the lubricant film from the gear teeth, it is customary to combine with the usual petroleum base of the lubricant, substances which increase the adhesive properties thereof, such as a lead soap with a stabilizer (sulphur, for instance). These additional agents have a slow abrasive effect on the ball or

that this holds particularly where taper roller bearings are used, which have an inherent pumping action. Any oil reaching the large tapered end of the bearing cup, he says, is immediately expelled, with the result that the small end of the rollers is starved and is frequently found quite dry. This, of course, tends toward overheating of the bearing and toward reduction of its life.

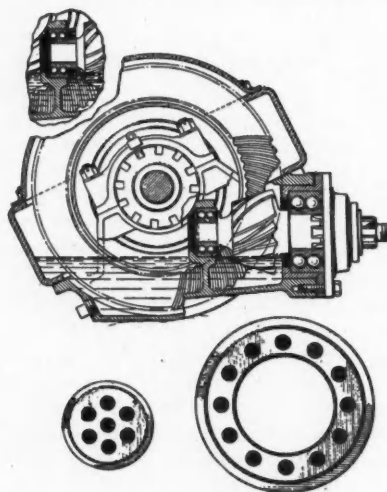
According to Mr. Mathews' invention,\* shelves are formed on the inner sides of the rear-axle housing, which shelves collect some of the oil splashed around by the ring gear. From these shelves the oil flows by gravity through ducts drilled in the bearing supports into spaces back of the bearings supporting the differential. Inasmuch as the pumping action of the bearings is in the direction toward the larger end

of the taper, the lubricant will be drawn through the bearings and onto the differential mechanism located between them.



Mathews lubrication system

\* No. 2,037,173. Lubrication System for Rear-Axle Differential Bearings. Philip E. Mathews of Plainfield, N. J., assignor to International Motor Co., New York, N. Y.



Griswold bearing protecting device

roller bearings and are objectionable. Walter R. Griswold, of Detroit, therefore, provides\* bearing protecting means through which the lubricating fluid must pass when entering the bearing cavity and by which it is filtered in such a manner as to exclude any material other than the petroleum base.

\* In patent No. 2,037,074. Walter R. Griswold, Detroit, Mich. Assignor to Packard Motor Car Co.

## Lubrication System For Differential Bearings

IN conventional designs of rear-axle drive gears the bearings often are inadequately lubricated, and Philip E. Mathews of Plainfield, N. J., claims

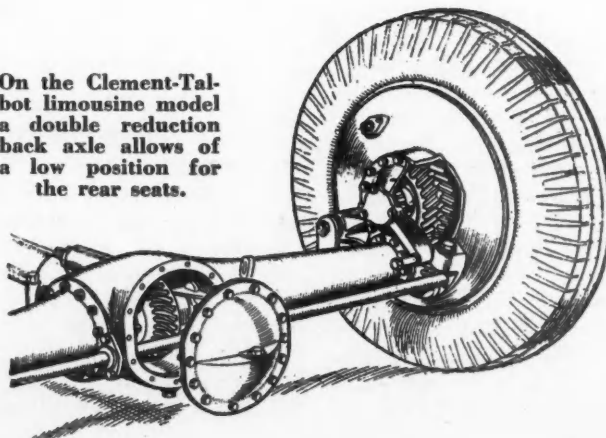
## New English Design of Double-Reduction Rear

In a limousine model turned out by Clement-Talbot, Ltd., of England, a double-reduction rear axle is used to make it possible to place the rear seat lower and thus lower the over-all height and the center of gravity of the car. A cut-away view of the axle is reproduced from *The Autocar*. There is a spiral bevel reduction gear at the center of the axle and a pair of herringbone gears near each wheel.

Clement-Talbot, Ltd., has just an-

nounced its line for 1936-37. Among the mechanical features of the Talbot line are a "Traffic" clutch which comprises two pivoted shoes inside a drum that engage the drum under the effect of centrifugal force as the engine is speeded up; and a central chassis lubricating system. A small hand pump beneath the hood takes its supply from the engine sump and lubricates the entire chassis, including the fan bearing. It appears that these features are continued from previous models and that very few mechanical changes have been made.—*The Autocar*, July 24.

On the Clement-Talbot limousine model a double reduction back axle allows of a low position for the rear seats.



# Blower Cooling of Radial Engines

*N. A. C. A. Research Indicates That Increased Radiating Surface Rather Than Greater Air Speed Reduces Power Required*

MUCH research work has been done in recent years with the object of finding methods of reducing the drag and improving the cooling of radial air-cooled engines. The N.A.C.A. cowlings have been used in practically all of these investigations. Recently the effect of the use of baffles and trailing-edge flaps to limit, direct and control the quantity of cooling air where N.A.C.A. cowlings are used has been investigated, and these investigations have resulted in a large reduction in the drag and a great improvement in the cooling.

Blower cooling of aircraft-engine cylinders has been investigated by the N.A.C.A. The quantity of air and the blower power required for cooling a single-cylinder air-cooled engine were determined. The tests were made on two cylinders having fins of different design. A report on this investigation is contained in N.A.C.A. Technical Note No. 572—"Performance of Air-Cooled Engine Cylinders Using Blower Cooling," by Oscar W. Schey and Herman H. Ellerbrock, Jr.

A Pratt & Whitney Wasp H and a Pratt & Whitney Wasp D cylinders

were used, with two different cooling-air jackets on each cylinder. The cooling air was supplied by a blower and measured with a Durley orifice box. Cylinder temperatures were measured with iron-constantan thermocouples connected to a portable pyrometer. Tests were made at engine speeds varying from 1500 to 2100 r.p.m.

The results obtained show that the difference in temperature between the cylinder and the air varied inversely as the 0.4 to the 0.6 power of the cooling-air weight per sec. and that the power required for cooling with each jacket varied approximately as the 2.83 power of the air weight. From these results it follows that, to cool an engine with minimum expenditure of power, an increase in cooling surface is to be preferred to an increase in air speed. The increase in cooling surface must be obtained by increasing the fin width and the number of fins, from the consideration that with a definite air weight it is better to cool with a low than with a high velocity. The extent to which each may be increased is limited. The width is limited by the effectiveness of the fin, which is de-

pendent on the thickness of fin and the thermal conductivity of the material; the spacing, aside from construction difficulties, is limited by the thickness of the fin and the amount that the space between the fins can be reduced without an appreciable decrease in air speed between the fins, change in the nature of the flow, or excessive heating of the cooling air. On the basis of other tests conducted by the N.A.C.A. laboratory, an appreciable amount of cooling surface can be added before reaching limits of either heat flow or air flow. The excessive heating of air between closely spaced fins impairs cooling to such an extent that it is a major consideration for conditions with restricted air flow.

The maximum temperature specified for satisfactory cooling has a large effect on the blower power required. Curves of percentage brake horsepower required for cooling at various temperature differences between cylinder and air (of which Fig. 2 is an example) indicate that it would be very desirable from a consideration of the power required for cooling to have an

(Turn to page 291, please)

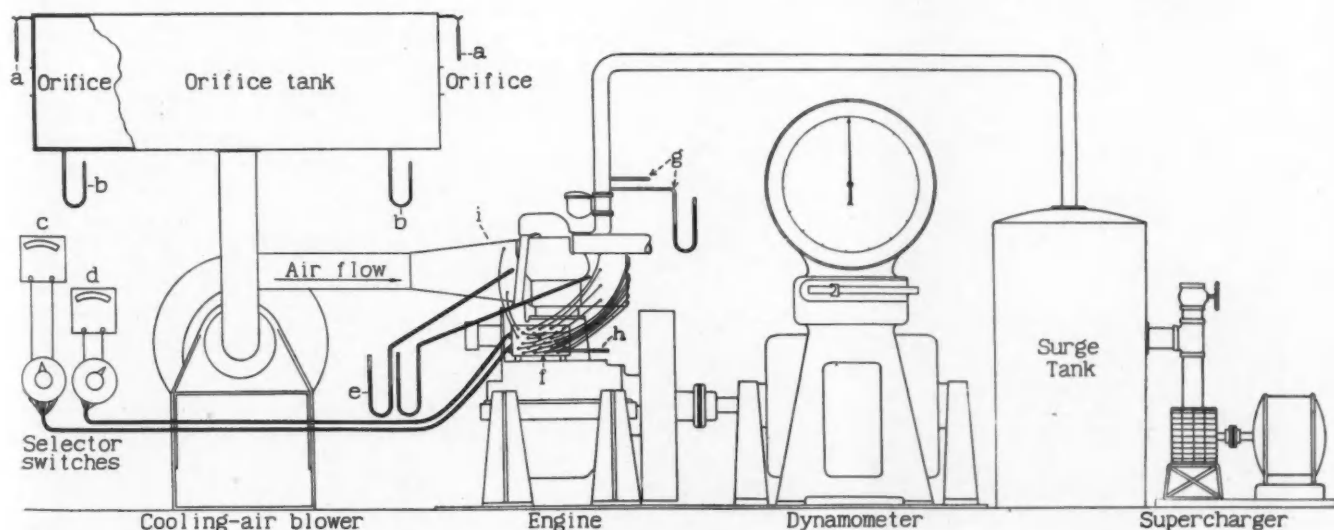


Fig. 1 — Diagrammatic layout of test equipment (refer to Fig. 2, page 291)

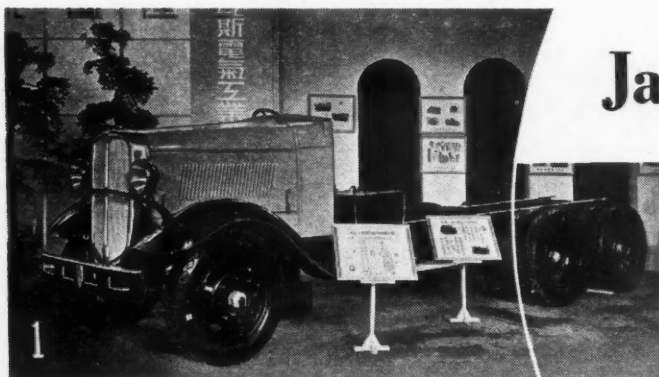
- a. Thermometer
- b. Water manometer
- c. Cylinder-thermocouple pyrometer

- d. Air-thermocouple pyrometer
- e. Static-pressure manometers

- f. Thermocouple terminal box
- g. Inlet-air thermometer and manometer

- h. Cold-junction thermometer
- i. Cylinder-air jacket

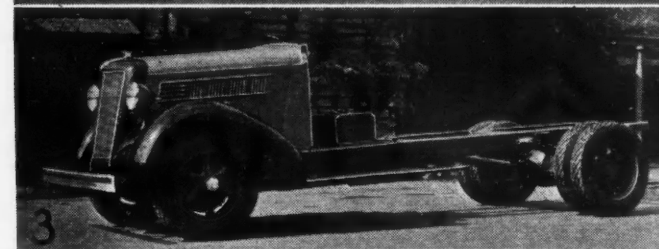
# Japanese Motor Vehicles



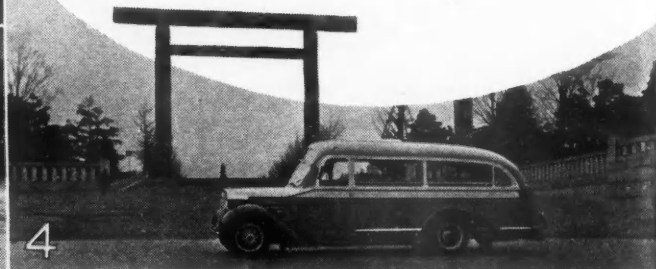
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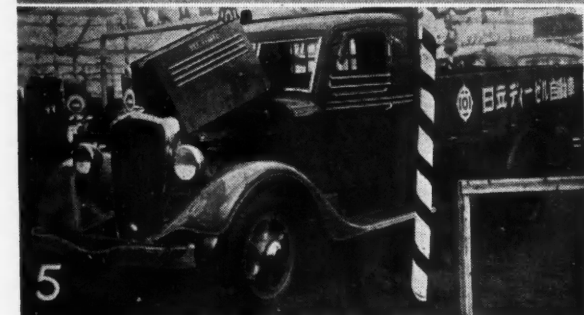
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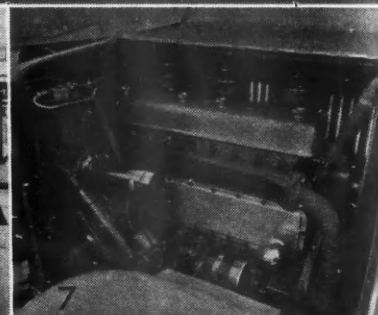
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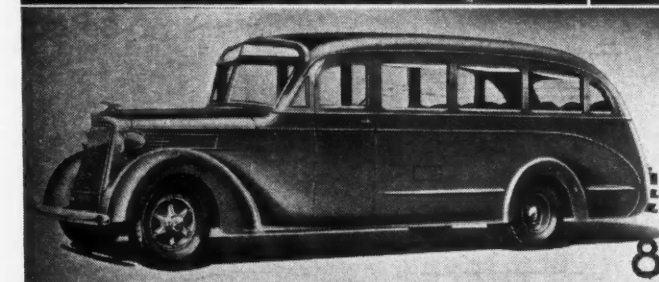
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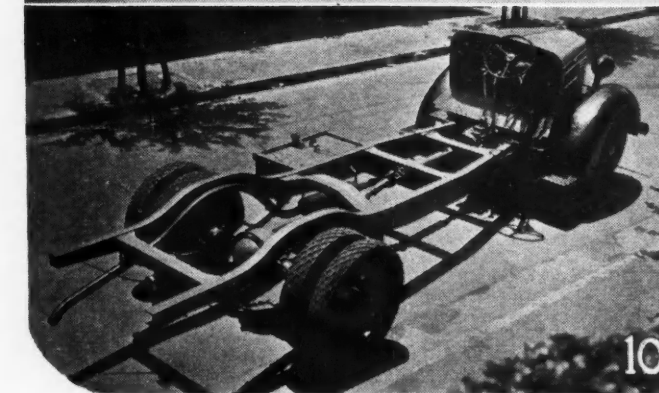
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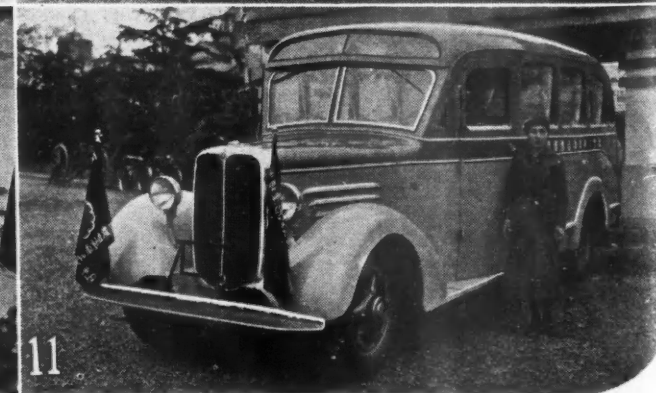
8



9



10



11

1. Sumida truck chassis

7. Mitsubishi 70 hp. Diesel engine

2. Shirato truck with charcoal gas generator

8. Kyodo streamliner bus

3. Isuzu truck chassis

9. A Mitsubishi Diesel engine drives this bus

4. 1936 Fuso bus for government service.

10. Kyodo bus chassis

5. Hitachi truck powered by a Diesel engine

11. Latest model Kyodo bus

6. Another Fuso bus

(Continued from page 275)

prepared to overcome difficulties inherent in the use of highly alcoholized fuel. Anxiety is also expressed in regard to the exportation of home-made cars because it is feared that engines using alcohol would not be received with favor by overseas buyers.

An interesting scheme that may have a far-reaching influence on future industrial developments in the island empire is the "village industries" plan of Viscount Masatoshi Ohkochi. The Viscount has been decentralizing the manufacturing operations of the Rikagaku Kenkyusho (Institute for Chemical and Physical Research) by establishing small factories in several villages in Niigata prefecture.

Japanese industrialists are attempting to educate the public to motorcar consciousness in an effort to build up the home market. To stimulate interest and to sound out native taste for motorcar body design, the Toyoda Automatic Looms and Motorcars Mfg. Co. inaugurated a contest for students of the Tokyo Fine Arts Academy and the Tokyo Industrial Arts School. Prizes were awarded on the basis of originality and technical feasibility. The company probably will adapt several of the designs to its 1937 cars. Several of the prize-winning designs are shown on pages 274 and 275.

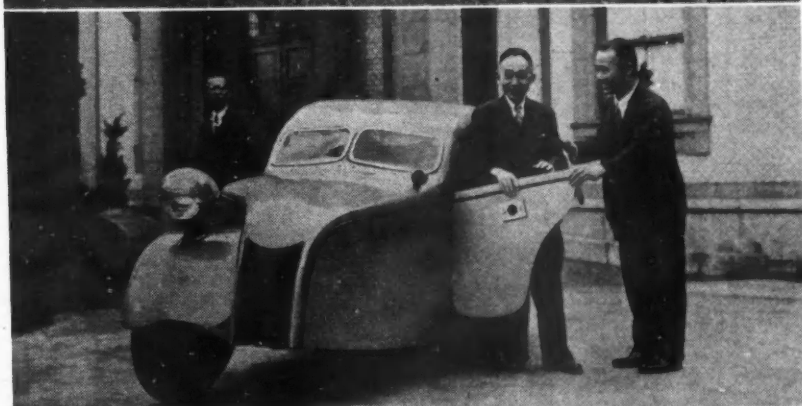
Photos, reading from top down:

1936 "Datsun" phaeton

The "Mixuho." A three-wheel car by the Haneda Engineering works.

The "Chiyoda"

"Datsun" sedan for 1936



### Japanese Engine Specifications

Make	No. Cyl.	Bore & Stroke (in.)	b.h.p.	r.p.m.	Piston Disp't (cu. in.)
Chiyoda	6	3.1875 4.25	70	.....	203.1
Datsun	4	.....	16	3600	.....
Fuso	6	4.33 5.32	70-100	2200	427
Fuso	6	4.13 5.52	70	1800	435
Ikegai	6	.....	50-60	3000	183
Isuzu	6	3.54 4.53	80	2800	262
Kyoda	6	3.0625 4.5	75	2800	198
Kyosan	2	3.0 3.228	7.2	.....	45.6
Sumida	6	3.1875 4.7187	75	.....	225
Toyoda	6	3.3125 4.0	65	3000	206.8

# Constant-Pressure Injection

**R. L. Boyer Cites Cost Of System As Limiting Its Applications On Small Automotive Diesel Engines**

WHILE most high-speed Diesel engines are equipped with jerk pumps, some lower-speed stationary and marine engines have the constant-pressure or common-rail injection system. R. L. Boyer, assistant chief engineer of the Cooper Bessemer Corp. said (at an S.A.E. meeting) the impression that those who still adhere to the constant-pressure system were behind the times was erroneous; and it was the

means for relieving the pressure in the injection lines between injections.

This resulted in the development of the atmospheric relief (Fig. 1) now standard on all engines of the company. Since the line pressure is completely relieved between injections, it does not matter much what condition the injection valve is in. The injection valve *D* is operated by a small pushrod *A*. Fuel pressure from the constant-pressure header is always acting on top of valve *D*, through the inlet *E*. During injection the valve is lifted by its pushrod, and fuel flows past the valve seat and out through passage *C* to the nozzle. With the seating of the valve the pushrod moves away slightly from the valve. There is a small drill hole through the pushrod which communicates with the port *B*, which latter in turn is in communication with the fuel tank. Any leakage past the valve seat between injections drains back to the fuel tank, and there is fuel pressure on the nozzle only during the injection period. Fig. 2 is a cross section of the actual valve and its pushrod.

This system lends itself well to the grouping of the injection valves in a central location, at the side of the en-

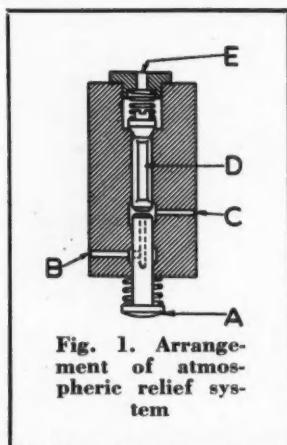


Fig. 1. Arrangement of atmospheric relief system

cost of the constant-pressure system which prevented its general use on small automotive engines. Mr. Boyer admitted that there were many objections to the earlier common-rail injection systems, including that of a tendency to develop leaks in the injection valve, at the valve seat. In one design formerly used by his company the seat of the nozzle valve was in the nozzle itself, and it was found almost impossible to keep these valve seats in such good condition over a considerable length of time that there would not be a certain amount of leakage. When the valve did leak, fuel entered the cylinder at the improper time, and the result might be anything from a light smoke in the exhaust to severe detonation. Some operators were able to keep such valves in good condition over considerable periods of time, and by exchanging them with spare valves at regular intervals, succeeded in obtaining a practically perfect exhaust at all times. However, the need for this constant attention was another point against the constant-pressure system as applied in the past.

To overcome the objections to the system the company with which the author is connected transferred the fuel-injection mechanism from the cylinder heads to a centralized point at the side of the engine and simultaneously developed

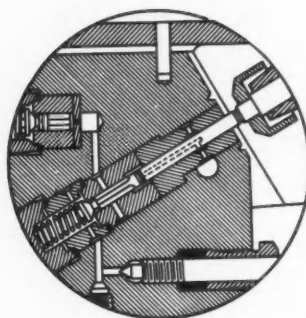


Fig. 2. Cross-section of injection valve and pushrod

gine. It was found best to group not more than four valves in one block, as in an eight-cylinder engine, for instance, the lines would become undesirably long if all valves were located together. Therefore, one injection block is used for engines with up to four cylinders and two are used for six- and eight-cylinder engines. A cross section of this injector block is shown in Fig. 3, where the valve and pushrod of Fig. 2 will be recognized. Fuel enters above the injection valve after having passed a small needle valve which serves to cut off the particular cylinder from the fuel supply. After passing the injection valve it flows past a check valve

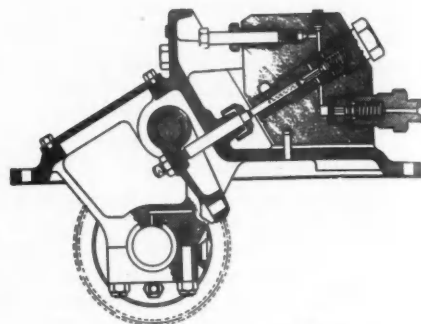


Fig. 3. Cross-section of injector block assembly

and then on into the line to the closed nozzle.

Governor control is by means of an eccentric shaft which controls the effective lift of the rocker. The latter is operated directly from the cam nose, the camshaft being contained within the unit itself. This makes a complete unit which may be timed and adjusted on the bench and installed on the engine without the need of further adjustment, the only thing to look out for being that the drive gears are correctly meshed. The injection valve itself or any part of the assembly for a particular cylinder can be easily removed, as can the entire injection block. The usual procedure would be to replace the entire unit, including the camshaft and operating gear.

## Cooling a Two-Row Radial Air Engine

IN two-row radial air-cooled engines the cooling of the rear row of engines naturally presents considerable difficulty. While remarkable progress has been made in improving the cooling facilities of such engines, troubles sometimes occur, especially under particularly severe conditions. Reduction gears, controllable-pitch propellers, increased specific outputs, superchargers and (in some cases) low-drag cowling all have helped to intensify the cooling difficulties.

A study of the cooling conditions of Pratt & Whitney 14-cylinder two-row radial engine (Wasp Junior) has been made by Oscar W. Schey and Vern G. Rollin of the N.A.C.A., and N.A.C.A. Report No. 550 deals with their findings. This engine, it may be recalled, has cylinders of 5½ in. bore and stroke each and is rated at 700 hp. at 2500 r.p.m. The compression ratio is 6.5 and the engine is equipped with a geared centrifugal supercharger turning at eight times crankshaft speed. This supercharger will maintain a manifold pressure of approximately 33 in. of mercury (abs.) at sea level when the engine is running at 2600

r.p.m. The propeller is driven through a 3:2 reduction gear.

The rear-row cylinders on this engine have more finning around the exhaust ports than the cylinders in the front row. Intercylinder baffles limit the amount of cooling air flowing past the cylinders. These baffles, as shown in Fig. 1, fit closely to the cylinders and are supplemented by pieces that fit closely to the fins at the top of the cylinder and extend outward to an N.A.C.A. cowling ring, forming a wall blocking off the area between the cowling and the engine. These baffles keep the air close to the cylinder and guide it to the rear of the cylinder.

A large number of thermocouples were installed on the engine, mainly

must be maintained for satisfactory cooling (500 deg. F. cylinder-head temperature) with air at a pressure of 29.92 in. of mercury and a temperature of 70 deg. F.

2. Increasing the brake horsepower 50 per cent, resulted in a 15 to 24 per cent increase in the temperature difference between the cooling surface and the cooling air.

3. The same percentage change in temperature difference between the cooling air and the cooling surface was obtained for a given change in power when the manifold pressure was varied as when the engine speed was varied.

4. Increasing the air speed from 60 to 120 m.p.h. resulted in a decrease of 17 per cent in the average difference in temperature between the cylinder

to be a good indication of mixture distribution in the engine.

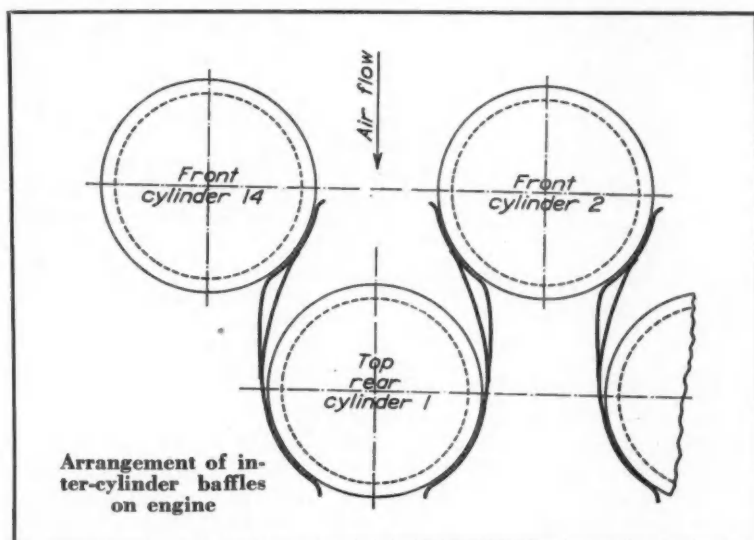
7. The effect of the attitude of the airplane on the cylinder temperatures was small and slightly dependent on location of the cylinder.

8. There was practically no difference in the cylinder temperatures obtained with either two-blade or three-blade propellers at an air speed of 120 m.p.h.; at an air speed of 80 m.p.h. the average cylinder temperature for all the thermocouples was 17 deg. F. lower with the three-blade propeller.

## Builds 12-In-Line Passenger Engine

**M.** GABRIEL VOISIN, the French manufacturer who two years ago announced what he referred to as "the car of the future," a four-wheeled "lozenge-shaped" car with central wheels at front and rear and side wheels about midway between, has now brought out another radical type—a twelve-cylinder-in-line. M. Voisin says he has built twelve-cylinder-V and eight-cylinder-V cars in the past, and in some of these the engine was moved forward over the front axle "in accordance with the trend of the times." He says he found this vehicle to be dangerous at high speeds, on account of its high moment of inertia around a vertical axis through its center of gravity. In his latest type, therefore, on which work was started in November, 1935, and completed toward the end of April last, the 12 cylinders are arranged in line and the engine extends well into the front compartment, which is said to be permissible because of its narrow form. This, of course, brings the center of gravity of the engine—the most important mass of the vehicle—much closer to the geometrical center of the car than in a V-12 with engine mounted over the front axle, thereby reducing the moment of inertia. M. Voisin states that he expects from this type of car

(Turn to page 292, please)



Arrangement of inter-cylinder baffles on engine

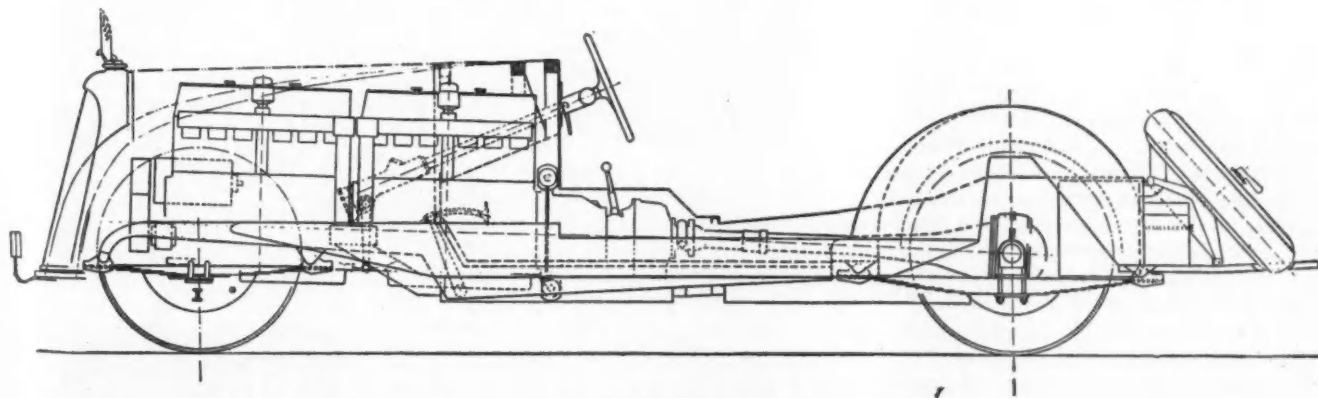
on the cylinder heads. All tests, except a few high-speed flight tests, were made in the Committee's full-scale wind tunnel which has a 30 by 60-ft. jet and a maximum air speed of 120 m.p.h. The following conclusions were drawn from the results obtained:

1. When operating at full-open throttle at an engine speed of 2500 r.p.m., an air speed of 120 m.p.h.

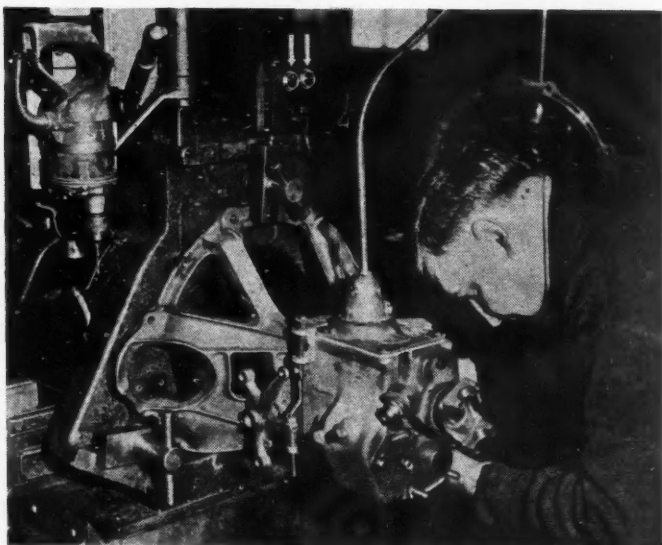
wall and that of the cooling air.

5. The heat loss to the oil under these particular test conditions was equal to from 3 to 6 per cent of the heat going into indicated power, depending on the engine speed and fuel-air ratio.

6. The amount the temperature of different cylinders changes when the mixture strength is varied was found



Side elevation of 12-cylinder-in-line car developed by M. Voisin, French manufacturer



A Terraplane transmission being tested in the "Silent Room" at the Hudson factory in Detroit. Two red lights, indicated by arrows, signal if gears are not exactly in line

## Production Lines

### Thermal Control

Thermostatic metals are coming into their own this year. As you read the car descriptions you will find thermostatic control of the lighting circuit, eliminating fuses; thermostatically controlled cigar lighters that pop out of the socket when sufficiently hot; and thermostatically adjusted piston clearance.

### Radial Engine

One of our friends who has just completed a tour of the West Coast manufacturers, tells us that a new engine builder out there has been making a right fine-looking four-cylinder radial job. In fact it's good enough to have attracted the attention of one of the largest car manufacturers who has it on test in Detroit. Without knowing a bit more about this, we may conjecture that if a small radial is being toyed with it is probably being eyed as a possibility for rear engine drive. Maybe we're wrong.

### E-P Lubes

There is going to be a very exciting situation on E-P lubes for next year considering that the bulk of '37 production will feature hypoids. Up to now the few car makers who have built hypoids have been fortunate in that the car owners have come to the factory service station for service. But with lower priced cars in the field, the situation is somewhat in the lap of the gods since the motorist will patronize his own independent repair shop and gasoline service station. One of the big problems lies in the fact that it would

be most unwise to mix two different makes of E-P when it is necessary to refill or add lubricant, because these things just don't mix. In fact one large oil company is on record to the effect that they will not refill but will replace the entire charge.

### Induction Heating

Remember we told you some months ago about the new process of induction heating for hardening crankshafts which was developed by Ohio Crankshaft Co. Well, one of the finest cars for 1937 will have the journals hardened by this process.

### Testing Machines

Those of you who are concerned with metallurgical and physical testing will want a copy of a new spiral-bound book issued by Tinius Olsen on its line of universal testing machines. It's a large sized book and carefully indexed so as to simplify the process of looking for the particular equipment in which you may be interested. Call on us for your copy.

### Forging Progress

There is a new spirit abroad today in the drop forging industry, crystallized by the activity of the Drop Forging Association which is fostering progressive lines of research and development. Engineers and production men will be interested in a newspaper form publication called "Drop Forging Topics" issued regularly by the Association. It discusses drop forgings in general and describes some recent suc-

cesses in forging parts heretofore made by casting. You should see this bulletin regularly.

### Diamond Holder

An improved form of the well-known Sta-Kool diamond holder is being offered for test in production departments. The new tool is provided with air-cooling fins which promote better dissipation of heat. We understand that you may have a demonstration of its performance without obligation, any time. We can arrange it for you.

### Auto Trailers

On our trip around recently we discussed on occasions the growing movement in the automobile trailer industry and a number of ideas came out of the interchange of thought. The central idea was: "Why wouldn't it be a smart thing to anticipate certain safety features before the movement grows beyond control?"

Here are a few points that might well be considered:

A provision for an outside rear vision mirror on every car that tows a trailer. This would be good not only for the operator but for others on the road. The installation of a suitable signalling device at the rear end of the trailer and connected electrically to the car compartment to permit the driver to signal his intention to turn or stop. A standard trailer hitch previously was mentioned in these columns. Finally, a good braking system, similar to commercial trailer applications, to assist on grades and in stopping.

—J. G.

**M**ANUFACTURING  
MANAGEMENT  
METALLURGY

# New DEVELOPMENTS

**Automotive Parts, Accessories  
and Production Tools**

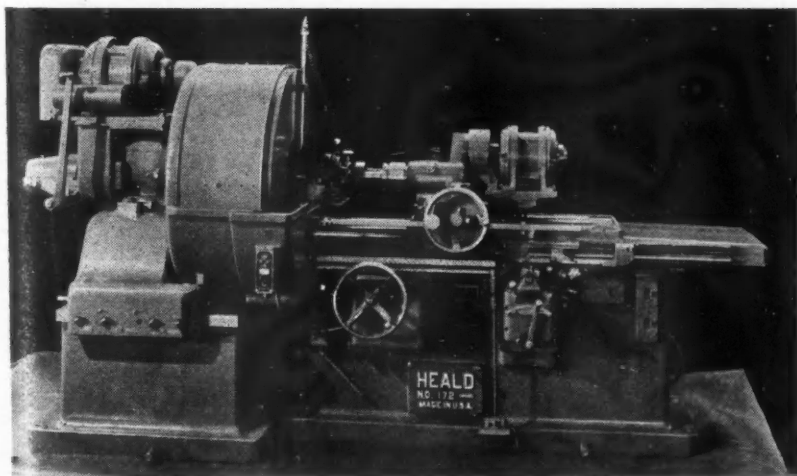
## Grinder

### **Heald Redesign Adds Capacity, Flexibility and Rigidity**

Heald Machine Co., Worcester, Mass., has introduced several refinements of design into the recently announced No. 172 Adjustable Gap Internal Grinder. This machine, like its predecessor the No. 72 Gap, is heavy-duty equipment for handling gears, plates, connecting-rods, housings and similar parts with medium-size holes but requiring generous work swing.

The principal features are as follows: the machine provides a 15 in. grinding stroke for holes up to 12 in. in diameter, different lengths of work are accommodated by an adjustable gap, increased rigidity is secured by a heavier base which is provided with an adjustable gap, the table is wider and heavier, table ways are fully protected and the workhead can be adjusted laterally to suit the length of the work.

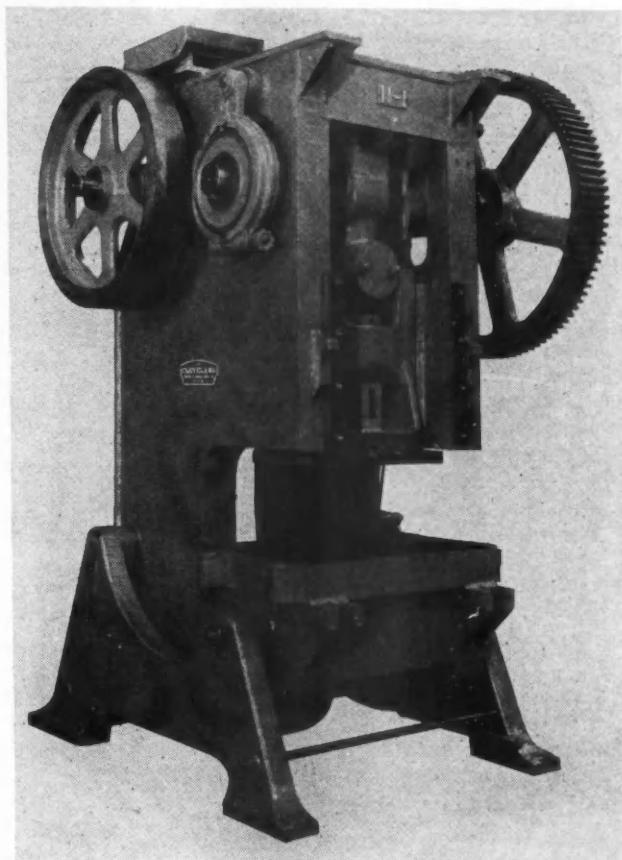
Increased rigidity of support for the workhead and work has been achieved by making the base heavier. Note in the illustration that the end of the base is stepped down and provided with ways on which the bridge holding the workhead can be moved to obtain an adjustable gap. These ways are pressure lubricated to insure a constant supporting film for the table.



**Heald adjustable gap grinder**

The main table, in addition to being heavier and wider, has larger ways. Combination of this increased mass and supporting surface with the Heald hydraulic table drive gives smooth table action with variable speeds up to 32 ft. per min.

Lateral adjustment of the heavy-duty workhead not only provides extra capacity for long work, but also permits the wheelhead spindle to be held to minimum length for increased accuracy in grinding short work.



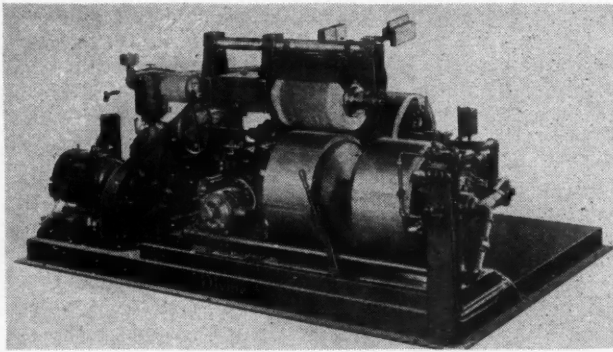
**Cleveland  
inclinable press**

## Inclinable Press

**Operates 40 Strokes Per. Min.;  
Capacity About 115 Tons**

A new inclinable press has been developed by the Cleveland Punch and Shear Works Co., Cleveland, O. This is a single geared type press arranged for direct connected motor drive. The machine is designed for a capacity of approximately 115 tons and an operating speed of 40 strokes per min. It is equipped with a block clutch and the brake is provided with a safety drop bar. The bed is 29 in. front to back and 40 in. across.

The welded steel frame (stress relieved after welding) is designed with box section housings, providing ample rigidity and minimum weight.



Divine Brothers  
sheet buffer

## Sheet Buffer

### *Continuous Production Provided By Two Drum Arrangement*

Divine Brothers Co., Utica, N. Y., have produced a machine for sheet buffing. Ferrous and non-ferrous sheets are cut-down, color buffed or satin finished many times more rapidly than by hand operations.

The standard machine accommodates sheets up to 16 in. wide by 7 ft. long by .020 in. thick. Sheets are held by vacuum or magnetic chucks on a revolving drum which brings the work in contact with the buffing wheel. Two drums, shifted by an air cylinder, provide for continuous production, as one drum can be loaded while the other is operating.

The wheel spindle will accommodate a buff 18 in. diameter by 18 in. face. A mechanism, which can be disengaged when not required, oscillates the buff to eliminate streaks in the work.

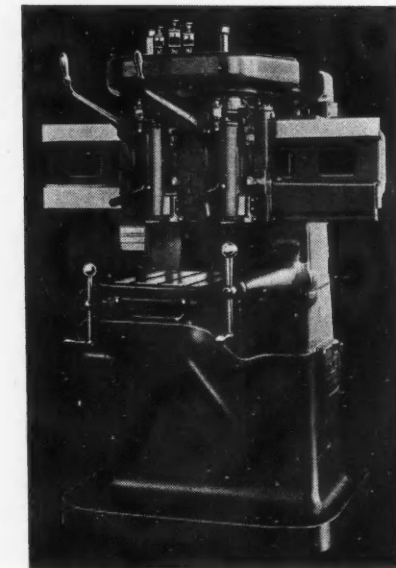
## Miller and Profiler

### *Machine For Small Parts Requiring Accurate Interchangeability*

Pratt and Whitney Div., Niles-Bement-Pond Co., Hartford, Conn., announces a new high speed vertical miller and profiler called the No. 12B. The machine is available with either one or two spindles, and can be supplied either as a single purpose machine or as a general purpose machine according to the work to be done and the spindle speeds desired.

When supplied as a general purpose machine the spindles are driven individually by four-speed motors, with motor and spindle pulleys interchangeable. This produces eight spindle speeds ranging from 300 to 3600 r.p.m. As a single purpose machine, constant-speed individual motors are used with step pulleys, providing four spindle speeds. In either case the spindle driving motors are one horse power, 50 or 60 cycle A.C.

Spindles are mounted in slides and have a vertical travel of 4½ in. The minimum distance from the table top to the spindle end is 3½ in. and the



P & W miller and profiler

maximum 8 in. Each spindle is mounted in two preloaded super-precision ball bearings at the bottom and a single floating ball bearing at the top. A built-in spring acts as a counterweight to offset the weight of the spindle and slide.

Cutters are held in the spindle nose by a drawbar operating from the top of the machine. This drawbar also

functions as an ejector for cutters.

The table working surface measures 14 in. by 18 in. and the table travel is 20 in. There is an 8 in. clearance between the table top and the bottom of the cross slide. The cross slide transverse movement is 22½ in. for the two-spindle machine and 27½ in. for the single spindle machine. Distance between the two spindles is 12 in.

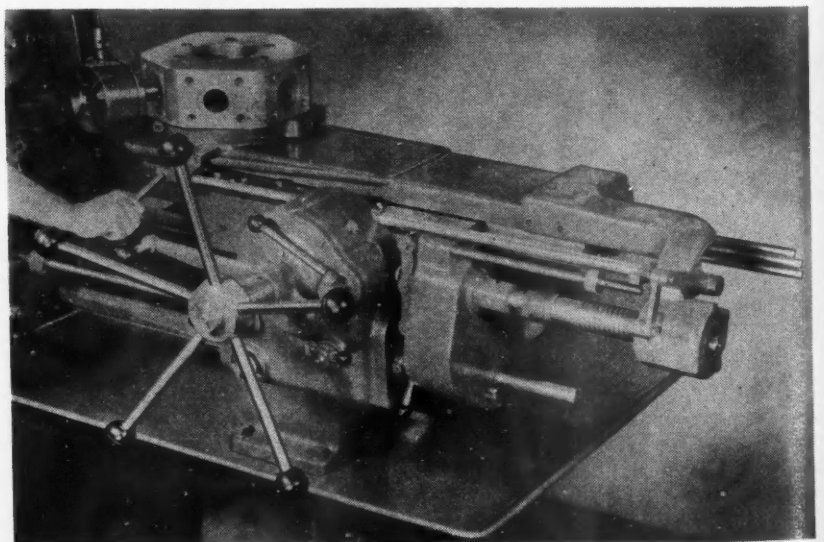
## Thread Chasing

### *Gisholt Develops Attachment For Accurate Cutting*

A thread chasing attachment for the No. 3, No. 4, and No. 5 Ram Type Universal Turret Lathes for cutting smooth, accurate threads has been announced by the Gisholt Machine Co., Madison, Wis. The new device makes possible the production of accurate threads without resorting to single-tool methods. It leads the die onto the work at a uniform rate governed by a section of lead screw. This results in the thread being free from the damaging influence of the drag of the turret and ram.

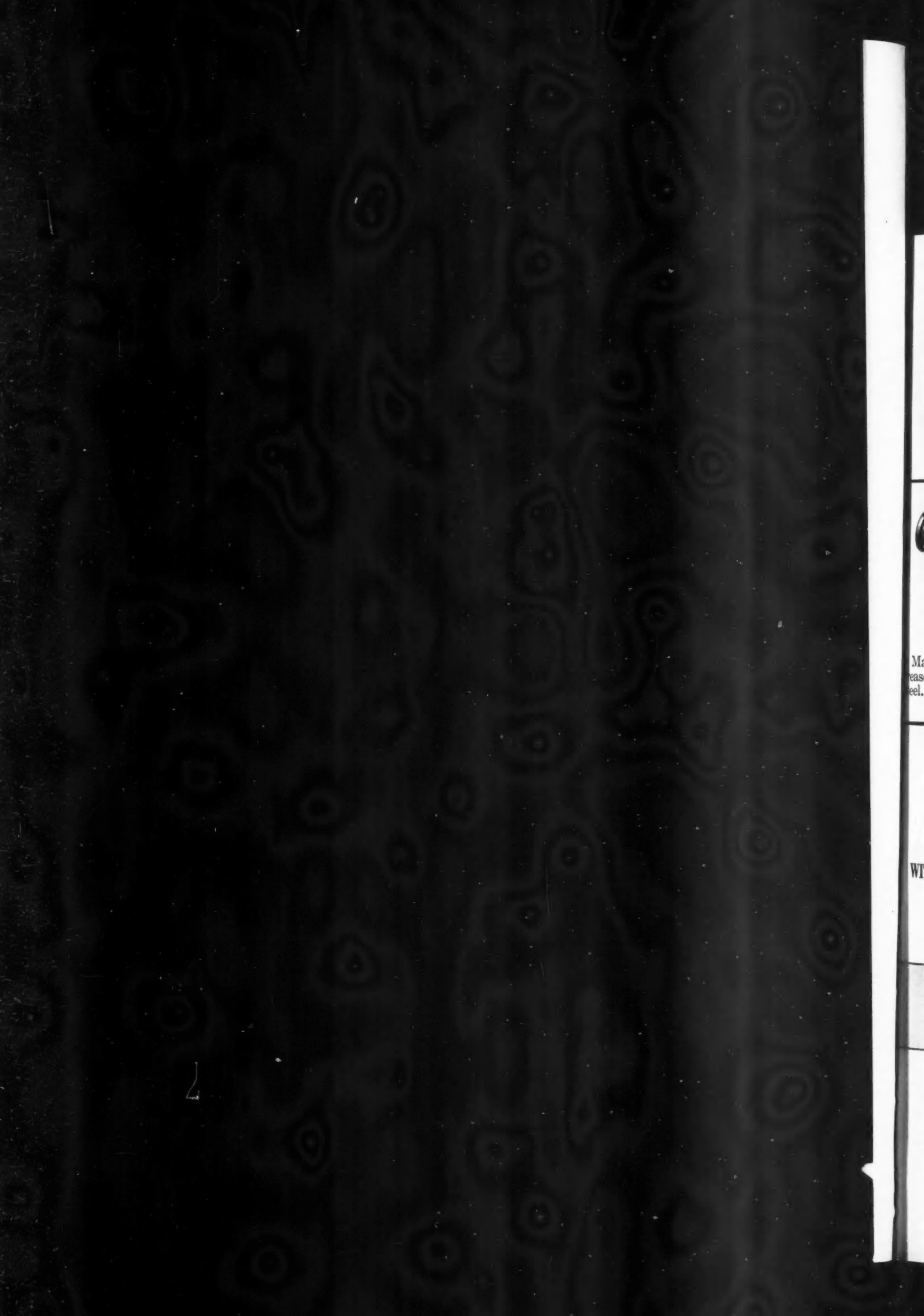
This threading attachment is of the leader and follower type consisting of a bracket for carrying the followers, a means of mounting and driving the leader, and suitable means for starting and stopping the threading feed. The leaders for this attachment may also be used with the universal carriage thread chasing attachment and are available with either standard milled threads or special ground threads. The leader is mounted on a shaft which is driven through a gear box at exactly the same speed and in the same direction as the feed shaft, which is in positive relation with the rotation of the

(Turn to page 291, please)



Gisholt thread chasing attachment





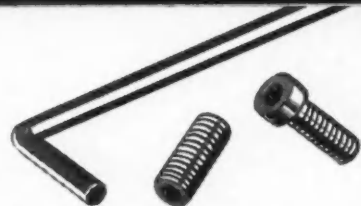
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IT'S EASY TO  
UNDERSTAND  
HOW . . . . .



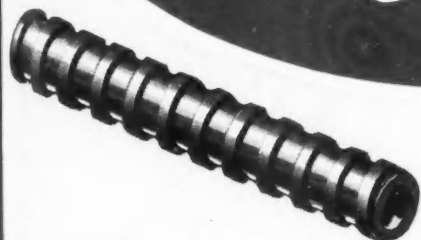
- It gives steel bars a smooth, bright finish which is largely retained as a quality feature of parts like this.



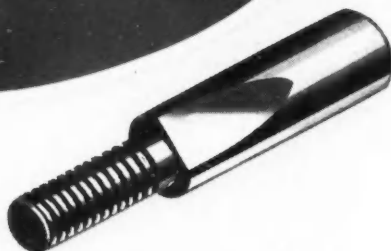
- It eliminates any need of machining to obtain close accuracy where the cross section of the bar corresponds with that of the part.

UNION COLD DRAWING

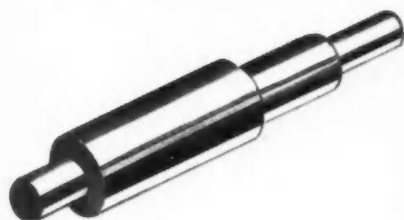
*Increases  
Production  
Efficiency*



Many applications benefit by the increased wear resistance which it gives to steel.

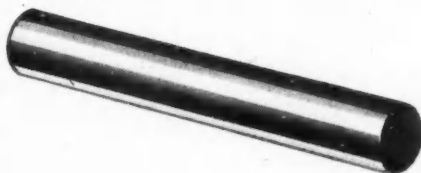


- It increases steel working strength so greatly that the need of heat treating many parts has been eliminated.

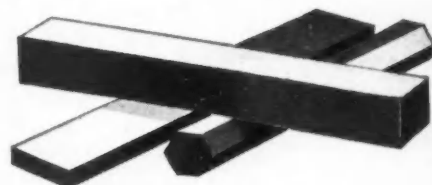


- The increased working strength which it provides permits reducing the size and weight of many parts.

WITH UNION COLD DRAWN STEELS



- Union Cold Drawn Rounds are accurate to size and concentricity within close tolerance, smooth surfaced and uniform in cross section throughout their length.



- The sharp corners, accurate angles, flat smooth surfaces and parallel sides of Union Cold Drawn Flats, Squares and Hexagons are extremely important advantages with many applications.

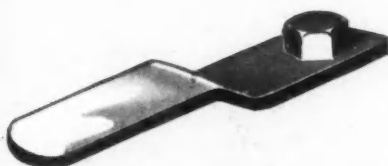


UNION DRAWN STEEL CO. • MASSILLON, OHIO

*Manufacturers of Efficiency Steels*

SUBSIDIARY OF REPUBLIC

STEEL CORPORATION



- Welded or copper brazed assemblies of Union Cold Drawn Sections with each other or with stampings, castings or forgings frequently develop cost reductions and quality advantages.



- The lustrous surface of Union Cold Drawn Bars provides good appearance for many applications. If desired, plating, lacquer, paint or enamel can be applied



## GIVES ALL THESE ADVANTAGES . . .

● The almost complete absence of abrasive elements from Union Free Cut has enabled many manufacturers to increase the profit on their output of Bessemer screw steel parts.

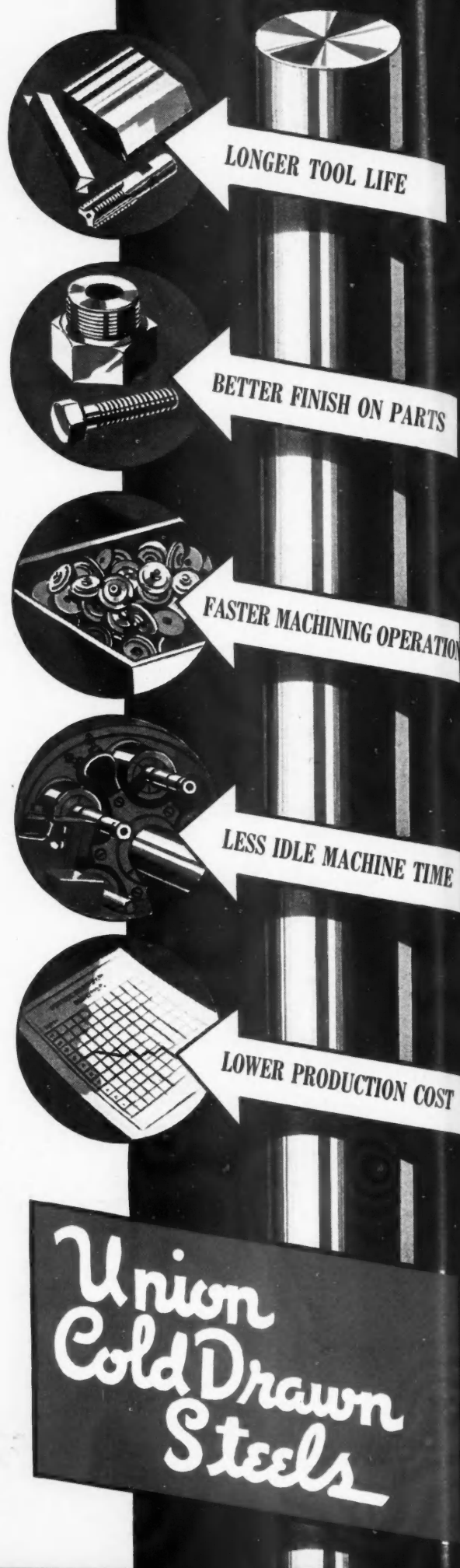
The life of cutting tools is greatly extended, resulting in more parts per dollar of tool investment and less expense for tool grinding. Forced idleness of machines for tool changes brings operations to a dead stop followed by many adjustments before production can be resumed. Now, the number of these costly shut-downs has been minimized.

In addition, Union Free Cut meets the highest requirements for quality. It machines rapidly to a lustrous, smooth surface. Threads and all other exacting details of parts are clean-cut and free from defects. Physical properties are equal to those usually associated with steel of the S.A.E. 1112 analysis.

You pay no premium for this more efficient steel. Use it with the expectation of better workmanship and lower costs. You will not be disappointed.

**UNION DRAWN STEEL CO., MASSILLON, OHIO**

*Manufacturers of Efficiency Steels*



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(Continued from page 288)

spindle or work piece. A collar, adjustable throughout the entire length of the turret travel serves as a threading feed trip. It releases a single tooth positive clutch driving the leader shaft and as the followers remain in engagement with the leader, the travel of the turret is stopped and the die head moved forward on its thread to trip itself. The accuracy of the trip combines an ability to thread closely to shoulders with the positive thread cutting feed.

By using a selective gear box which is coupled to the feed shaft, one leader will cut three threads having one, two and four times the pitch of the leader. Threading capacity is from 4 to 32 threads. The gear box permits the use of coarse pitch leaders and followers when cutting fine pitch threads. For example, to cut 24 threads without this gear box, a 12 pitch leader would be required. With the gear box, a six pitch leader may be used. Also, when a wide variety of threads must be provided for, the gear box greatly reduces the number of leaders required. The selective gear box also makes available three ranges of eight feeds, 24 in all, ranging from .001 in. to .104 in.

## Gear Shaving

### Michigan Uses Serrated Cutter Mounted On Vertical Arbor

Illustration shows one of a battery of Michigan Tool Co. internal gear shaving machines used as part of equipment for finishing the internal helical gear teeth in the overdrive ring gear at the Warner Gear Div. of Borg-Warner Corp., Muncie, Ind.

Operation of this machine embodies the fundamental principles of crossed-axes gear shaving typical of Michigan Tool shaving machines. Shaving is achieved by means of a serrated cutter

mounted on a vertical arbor, the latter being held in an eccentrically driven holder. The ring gear is held in place in a pot-chuck fitted with adapters which may be varied to accommodate a wide range of gear blanks.

## Pulsator

### Automatic Lubrication System For Industrial Equipment

Some time ago we described the Blanchard Pulsator, the automatic oil lubrication system for industrial equipment and machine tools, made by Rivett Lathe & Grinder, Inc., Boston, Mass. A recent check shows that this system has been adopted as standard equipment by the following machine tool builders—National Automatic Tool Co., R. K. LeBlond Machine Tool Co., National Acme Co., and the Davenport Machine Co. Other well-known machinery builders are supplying the automatic lubrication system when specified by the user.

In addition, a large group of automotive manufacturers have made Pulsator installations on special equipment as well as on some of the machine tools being ordered for 1937 production.

It is claimed that important features of the system are the provision for automatic lubrication of production machinery, thus eliminating the need for constant supervision and service, as well as to safeguard the life of the equipment.

## Blower Cooling

(Continued from page 281)

engine that could operate at high temperatures with no impairment of reliability or performance.

From the results of these tests the

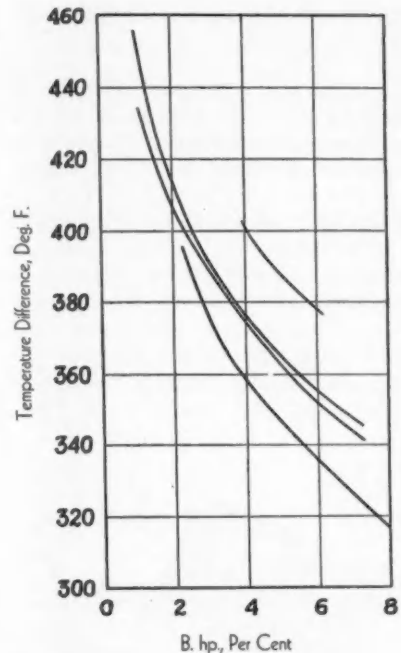


Fig. 2—Effect of difference between cylinder and air temperatures on percentage of brake hp. required for cooling at 1500 r.p.m. for four cylinder and jacket combinations

following conclusions were drawn:

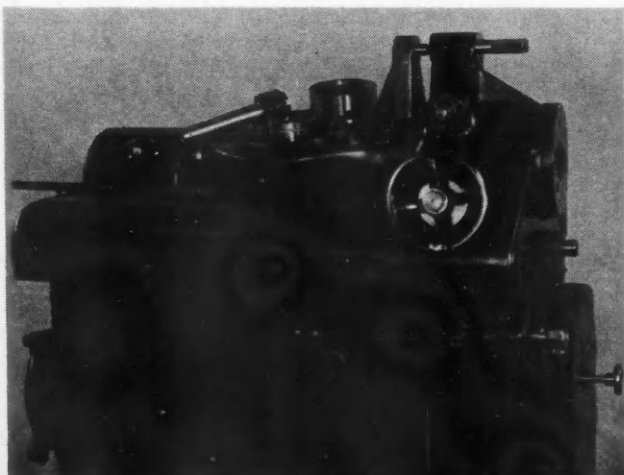
1. The minimum power required for satisfactory cooling with an over-all blower efficiency of 100 per cent varied from 2 to 6 per cent of the engine power depending on the operating conditions.

2. The shape of the jacket had a large effect on the cylinder temperatures. Increasing the air speed over the front of the cylinder by keeping the greater part of the circumference of the cylinder covered by the jacket reduced the temperatures over the entire cylinder.

3. The temperature difference between the cylinder and the cooling air varied inversely as the 0.4–0.6 power of the cooling-air weight, depending on the location of the thermocouple; those on the barrel varied as the higher power of the air flow.

4. The total head drop across the cylinder varied as the 1.77–2.04 power of the cooling-air weight, depending on the cylinder and jacket combination. The power required for cooling varied as the 2.81 power of the cooling-air weight for three of the cylinder and jacket combinations and as the 2.90 power for the fourth combination.

5. An air quantity of 1.09 lb. per sec., properly directed and kept in contact with the cylinder, would satisfactorily cool the Wasp H cylinder when it was developing 45 b.h.p., maximum temperature being 475 deg. F.—P.M.H.



Michigan gear shaving machine

## Ford's Vocational School

(Continued from page 278)

During the first two years of this training period or until he finishes the course an apprentice must attend one class each week in mechanical drawing and one in mathematics. Each student does all his class work on his own time. This school has 22 full time instructors. About one-third of the students are regular Ford employees, the remainder being considered as apprentices. It is from these trained men that the company recruits its foremen and specialty men.

In addition to apprentice classes, courses in electricity, steam engineering, metallurgy and metallography are conducted for the benefit of those employees whose work makes information in these subjects helpful.

The Ford Training School is the most recent addition to the Ford educational system. In June, 1935, the company opened a department for a limited number of recent high school graduates unable to find employment. Students are selected from lists furnished by local Boards of Education. They should be between 18 and 20 years of age. This department has modern

equipment for tool room, electrical work and gasoline motor repair, and there are 21 full time shop instructors. Students do only shop work and do not attend classes.

The training continues for three months during which time the student receives \$22 a week. At the end of this period he is offered work in Ford Motor Co. in a department for which he has shown fitness, at the regular rate of 75 cents an hr. As 200 is capacity for the department, 800 can be placed in gainful employment each year.

## 12-Cylinder-In-Line Car

(Continued from page 285)

exceptional road-holding ability, silence, high acceleration, flexibility, and especially complete response to the controls on low-adherence pavements such as tar and slippery asphalt. The car has a speed of 100 m.p.h.

M. Voisin expresses the opinion that an ideal car, which will respond perfectly to the controls, must have its engine, transmission and controls placed between the passengers, the masses at front and rear of the car being made as small as possible. This, of course, is directly contrary to the general trend of design in recent years, which has been to place large masses at both front and rear with a view to reducing the pitching frequency and thus render the car more comfortable to ride in.

It would also seem that a twelve-cylinder-in-line would have a crankshaft assembly with a very low natural frequency of torsional vibration, so that even the lowest harmonic of the gas-pressure torque would be likely to come into resonance with the crankshaft assembly at some speed within the normal working range of the engine.

## Iron Alloys

Production, Heat Treatment, and Properties of Iron Alloys, by Louis Jordan. For sale by the Superintendent of Documents, Washington, D. C. (10 cents).

THE National Bureau of Standards receives many requests for information on the meaning of terms used in iron and steel metallurgy, methods of heat treating iron and steel, and for simple directions for and explanations of such processes.

This informative circular describes very briefly the reduction of iron ore, the production and properties of cast irons, the production and fabrication of steels, and also discusses the fundamental principles upon which the heat treatment of steel is based. There are also included brief discussions of the equipment used in heat-treatment processes and the major types and chief characteristic properties of alloy steels.



Ground pilots insure concentricity in Mechanics Roller Bearing Universal Joints. This promotes perfect balance, is vital in smooth running. Design of Mechanics Universal Joints is simple and compact. All parts that have any appreciable effect on balance are machined all over. Lubrication provisions are generous, assembling easy—and integral keys transmit the torque. These joints are used in leading cars, trucks, busses. Write today for complete information.

**MECHANICS UNIVERSAL JOINT DIVISION**  
Borg-Warner Corp. 1301 18th AVE., ROCKFORD, ILLINOIS